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THE UNIVERSITY OF ALBERTA

THE TEACHER, OPERANT TECHNIQUE AND  
SPECIAL CLASS BEHAVIOR CHANGE

BY



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THE UNIVERSITY OF ALBERTA  
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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "The Teacher, Operant Technique and Special Class Behavior Change" submitted by Marilyn Elizabeth Crozier in partial fulfilment of the requirements for the degree of Master of Education.

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## ABSTRACT

The study was undertaken in an attempt to design and evaluate a teacher training program in operant principles and techniques. It was expected that a teacher educated through such a program would effect change in her own behavior and in the behavior of her students.

A special class teacher participated in a two-day teacher training program designed specifically for this investigation. Training was followed by consultation sessions with the experimenter, amounting to approximately ten hours, over a period of eight weeks.

Baseline measures of academic achievement and time spent in academic behavior were taken on twelve subjects three and one-half weeks before and again immediately prior to the training program. In addition, student-teacher interaction was systematically examined via Flanders Interaction Analysis. All criterion measures were repeated three and one-half weeks after the training program. A further post-test omitting only the Flanders Analysis was also performed in the last week of the school year, seven weeks subsequent to teacher training.

The analysis of the data revealed that behavior change had indeed occurred. Student time spent in academic behavior had increased; also, the teacher demonstrated a



decrease in criticizing and disciplining. Thus, confirmation was obtained for the underlying hypothesis. That is, a highly compressed training program in operant technique accelerates a teacher's ability to initiate behavior change in the classroom.

Specifically, there was:

- (1) an increment in academic behavior, and a corresponding decrement in non-academic and disruptive behavior,
- (2) a decrement in the amount of criticizing and disciplining demonstrated by the teacher, and,
- (3) an increment in academic achievement (as measured by the Wide Range Achievement Test).



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## TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION AND STATEMENT OF THE PROBLEM .	1
Introduction. . . . .	1
The Thesis Problem . . . . .	4
II. REVIEW OF THE LITERATURE . . . . .	7
Theoretical Framework . . . . .	7
Principles of Operant Conditioning. .	7
Operants and their consequences . .	7
Extinction and punishment . . .	9
Scheduling . . . . .	9
Discrimination and generalization .	10
Shaping . . . . .	11
Some Further Considerations of Behavior	
Modification. . . . .	12
Immediate contingency . . . . .	12
Premack's principle . . . . .	13
Eliminating undesirable behavior. .	13
An Objective Classroom Technique . .	16
Related Research. . . . .	18
Behavior Modification in Special Class	
Situations . . . . .	18
Various Approaches. . . . .	19
The Study . . . . .	22
The Direction of the Study. . . . .	22
Scope of the Study. . . . .	24





CHAPTER	PAGE
Population and areas of investi-	
gation. . . . .	24
Design of the experiment. . . . .	24
Hypotheses . . . . .	25
III. PROCEDURE AND DESIGN . . . . .	27
Sample . . . . .	27
The Teacher . . . . .	27
The Student Subjects . . . . .	27
Instruments . . . . .	29
Wide Range Achievement Test . . . . .	29
Stanford-Binet, Form L-M . . . . .	30
Flanders Interaction Analysis . . . . .	31
Other Evaluative Procedures . . . . .	33
Recording of Time Spent in Academic	
Behavior. . . . .	33
Administrative Procedures . . . . .	33
Wide Range Achievement Test (WRAT). . . . .	34
Flanders Interaction Analysis . . . . .	34
Recording of Time Spent in Academic	
Behavior. . . . .	34
Follow-up . . . . .	35
Analysis . . . . .	36
The Teacher Training Program . . . . .	36
Classroom Procedures . . . . .	38
Individual folders . . . . .	38



CHAPTER	PAGE
Point system. . . . .	39
Group points. . . . .	40
Exchange of points . . . . .	40
Methods of dealing with undesirable behavior . . . . .	41
Summary . . . . .	41
IV. FINDINGS AND CONCLUSIONS . . . . .	43
Hypothesis I. . . . .	43
Findings . . . . .	43
Conclusions . . . . .	49
Hypothesis II . . . . .	50
Findings . . . . .	50
Conclusions . . . . .	52
Hypothesis III . . . . .	52
Findings . . . . .	52
Conclusions . . . . .	55
Summary . . . . .	55
V. DISCUSSION AND IMPLICATIONS . . . . .	57
Discussion . . . . .	57
Discussion of Results . . . . .	57
Discussion of the Program . . . . .	58
Evaluation by the teacher . . . . .	58
Evaluation by the students . . . . .	60
Evaluation by administrators. . . . .	60
Evaluation of costs of the program . . . . .	61



CHAPTER	PAGE
Implications . . . . .	62
Implications for Research . . . . .	62
Implications of Operant Technique for Education . . . . .	63
REFERENCES . . . . .	67
APPENDIX A: Criteria for Academic and Non-Academic Behavior . . . . .	77
APPENDIX B: Reading Assignments . . . . .	79
APPENDIX C: Questions . . . . .	82
APPENDIX D: The "Lennie" Tape . . . . .	86
APPENDIX E: Major Principles . . . . .	89
APPENDIX F: Film: Controlling Behavior Through Reinforcement . . . . .	93
APPENDIX G: Video Interview with Teachers . . . . .	95
APPENDIX H: Methods . . . . .	97
APPENDIX I: Rewards . . . . .	99
APPENDIX J: Diagram of Classroom . . . . .	101
APPENDIX K: Record of Time Spent by Experimenter and Teacher . . . . .	103
APPENDIX L: Job Sheet . . . . .	105
APPENDIX M: Point Sheet . . . . .	107
APPENDIX N: Summary of Analysis of Variance of WRAT Reading, Spelling, and Arith- metic Scores During the Four Different Observation Periods . . . . .	109



CHAPTER	PAGE
APPENDIX O: Teacher's Questionnaire . . . .	112
APPENDIX P: Basic Data of Study . . . .	118





## LIST OF TABLES

TABLE		PAGE
1.	Description of Students by Age, Sex, and IQ (Test Administered by School Psychologist). . . . .	28
2.	Description of Students in Terms of Family and School Background. . . . .	29
3.	Mean Time Spent in Academic Behavior by the Group During the Four Different Observation Periods . . . . .	44
4.	Summary of Analysis of Variance on Mean Time Spent in Academic Behavior by Eleven Subjects . . . . .	45
5.	Scheffé Test of Difference Between Means for all WRAT Subtests for all Administrations. . . . .	53
6.	Correlation of WRAT Gain Scores with MA, CA, and IQ . . . . .	54
7.	Mean Grade Levels for Class in Reading, Spelling and Arithmetic During Each Time Period . . . . .	55
8.	Summary of Analysis of Variance of WRAT Reading Scores During the Four Different Observation Periods . . . . .	109



TABLE	PAGE
9. Summary of Analysis of Variance of WRAT Spelling Scores During the Four Different Observation Periods. . . .	109
10. Summary of Analysis of Variance of WRAT Arithmetic Scores During the Four Different Observation Periods. . . .	110



## LIST OF FIGURES

FIGURE	PAGE
1. Mean Percentage of Time Spent in Academic Work for Each Student During the Four Different Periods of Observation. . . .	46
2. Percent Time Spent in Academic Work for Six Subjects During Baseline and Post-intervention Phases . . . . .	47
3. Percent Time Spent in Academic Work for Five Subjects During Baseline and Post-intervention Phases . . . . .	48
4. Flanders Interaction Analysis . . . . .	51



## CHAPTER I

### INTRODUCTION AND STATEMENT OF THE PROBLEM

#### *Introduction*

The twelve children in Mrs. Chisholm's\* junior opportunity classroom have been given arithmetic assignments. Mrs. Chisholm is explaining the intricacies of the "tens column" to Selma Thompson. Jeffrey Swaine has been working on his arithmetic for approximately two minutes and now appears to be having difficulty.

"Mrs. Chisholm, I can't do this."

"Just a minute, Jeffrey, I'm busy with Selma."

Jeffrey puts his pencil down and slumps in his seat. About thirty seconds pass and he once again tries to gain Mrs. Chisholm's attention.

"Mrs. Chisholm, I still can't do it."

"Jeffrey, you must wait your turn," Mrs. Chisholm says firmly.

Presently, loud sniffing noises are heard coming from Jeffrey's direction. Jeffrey is crying while he attempts to destroy one leg of his desk with hearty kicks. Mrs. Chisholm hurries to Jeffrey's desk equipped with kleenex, words of consolation, and Jeffrey's favorite puzzle. Arithmetic is over for today.

---

\*While the incident is real, the names are fictitious.





Later, Mrs. Chisholm is discussing Jeffrey with another teacher.

"I don't know what's got into Jeffrey lately. Every time he has the least bit of difficulty, he cries and loses his temper. He must be slower than I thought."

Jeffrey, however, has been learning quickly. He has learned that certain behaviors lead to certain consequences. When he cries and loses his temper, he is rewarded by receiving attention and his favorite puzzle. Jeffrey will undoubtedly demonstrate his inappropriate behavior again. As the behavior occurs and is reinforced (that is, with puzzles and affectionate concern), the likelihood of future occurrences increases. The reason behind the increase in maladaptive behavior is simple: it pays off (Mees, 1964). As the disruptive behavior becomes more frequent, academic production will decrease. Jeffrey's inability to "learn" will be easily explained: Jeffrey is "mentally retarded" or "emotionally disturbed" (or described by some other all-inclusive term).

Educable retarded children like Jeffrey are traditionally considered to be inferior in learning ability. They are expected to learn more slowly, with more difficulty, and with less retention than normals. Consequently, educational programs for the retarded usually consist of "watered-down" regular curriculum -- the same material is offered in the special class in the same manner as it is



given to the normal individual, but in lesser amounts, and at a slower rate.

Baumeister (1967, p. 182), however, indicates that the research available on the abilities of retardates suggests something different: that the learning deficiency of mildly and moderately retarded persons is task-specific or related to only certain aspects of the learning situation. Ellis (1963), for instance, hypothesizes a specific deficit in short term memory in retardates. Zeaman and House (1963) have attempted to analyze the learning deficits of mental retardates in terms of an attentional model of discrimination learning. They believe the retardate's basic problem is a low initial probability of attending to the relevant stimulus dimensions. Luria (1963) states that the retarded person uses language in an inefficient manner: he has not learned to control his actions through the "second signal system". Zigler (1969) feels that lack of motivation is an important factor in the learning ability of the retarded. He points out the detrimental effects of both the environment and of the many failure experiences of the "cultural familial" type of retardate.

The above theories essentially stress an "organism defect" approach. It may be that, one, some, or all of these theories are correct. Baumeister (1967, p. 191) suggests that another view is that for a given individual, the environment is "defective". According to this view,



one might expect to improve the functioning of the defective individual by manipulating the environmental conditions that are related to the deficient behavior.

Jeffrey's inappropriate behavior, therefore, might be explained as a result of his environment. Mrs. Chisholm is probably the major influence on Jeffrey in the classroom. Jeffrey lost his temper, and Mrs. Chisholm rewarded him. Her intentions were good: to keep Jeffrey happy (and to maintain classroom order) while she was assisting another child. Mrs. Chisholm failed to assess the results of her actions, and therefore does not realize that she is actually encouraging "bad behavior." Jeffrey's behavior will not change until his environment is changed.

### *The Thesis Problem*

The special class student often has a history of inattentiveness and inappropriate behavior (Werry and Quay, 1968; Hamerlynk, Martin and Rolland, 1968). Along with any "learning problems" such a child might have, the special class teacher is expected to remediate his behavior as well (Hewitt, 1967). A child who is incapable of self-control and productive classroom behavior would presumably profit little from the skills which the teacher has to offer. Special class teachers need a way of structuring the classroom environment so that appropriate behavior (such as self-control and attentiveness) will be established.



It is anticipated that the structuring system used would garner teacher acceptance if it was efficient, effective and did not overburden the teacher with administrative details (Patterson, Shaw and Ebner, 1968, p. 18). The principles of operant conditioning appear to constitute just such a system, which could aid in behavior modification of the child in the special class situation (Crosson, 1969; Lovitt, 1968).

A large number of studies, have, in fact, demonstrated success in the use of operant techniques for modifying behavior in the special class (Birnbrauer and Lawler, 1964; Birnbrauer, Wolf, Kidder and Tague, 1965; Hewitt, 1967; Lovitt, 1968; Mattos, Mattson, Walker and Buckley, 1969; McKenzie, Clark, Wolf, Kothera and Benson, 1968; Nolen, Kunzelmann and Haring, 1968; Osborne, 1969; Sulzbecker and Houser, 1969; Valett, 1966; Wolf, Giles and Hall, 1968; Wolf, Risley and Mees, 1969). Why, then, should not such an approach be more widely used by special class teachers? It appears to the present investigator that there are two major reasons: (1) most of the experiments carried out thus far have required one or more of the following: additional personnel, special equipment, additional space; and, (2) teachers are trained to use techniques with very little understanding of the principles underlying the techniques.

Since many special classes do not have access to







teacher aides, additional space or elaborate equipment, techniques which do not require these may gain easier acceptance. Moreover, the techniques should be flexible enough to cover the range of individual differences in classrooms, teachers, and students (American Psychological Association, 1970, p. 268). It could be argued that the teacher has the greatest opportunity to examine the special requirements of her classroom, her students, and herself. This conceded, then, the teacher is a logical person to involve in the design of techniques suitable for her particular situation. In order to be able to formulate new techniques and choose from existing ones, familiarity with the theoretical principles underlying the techniques would be an asset (Hewitt, 1967, p. 466). With a sound understanding of principles of operant conditioning, Homme, Csanyi, Gonzales and Rechs (1969) suggest that limitations in their application are largely a matter of the teacher's creativity.

The present study investigates whether a teacher educated in operant principles and techniques can effect accelerated student behavior change.



## CHAPTER II

### REVIEW OF THE LITERATURE

The following consists of two sections, the first of which deals with the definitions and theoretical framework of operant technique. The second section specifically focuses upon studies utilizing these techniques in special class situations. The reader already familiar with operant technique will find the first section redundant and may wish to merely overview the second portion which reviews recent applications of the techniques. However, the serious student who wishes to review operant technique will want to read the first section in order to more critically evaluate the outcome of the investigation.

#### *Theoretical Framework*

##### *Principles of Operant Conditioning*

*Operants and their consequences.* Bijou and Baer (1961, p. 32) describe operants as behaviors which are best understood as functionally related to their consequences in the environment. The word "operant" is used because it suggests that the individual operates upon his environment to produce some stimulus event or change in a stimulus or setting event. Operants are controlled by stimulus consequences -- those observed in the child's current situation as well as those in his past. Operants may



produce consequences in the following ways:

- (1) They may produce certain stimulus events, and as a result the operants increase in frequency. These stimuli are called positive reinforcers.
- (2) They may remove, avoid, or terminate certain other stimulus events, and as a result the operants increase in frequency. These are called negative reinforcers.
- (3) They may produce or remove still other stimuli which fit neither of these categories; that is, they fail to strengthen a response, whether the response produces the stimulus or removes it. These stimuli are called neutral stimuli (Bijou and Baer, 1961, p. 33).

Finding out whether a stimulus is reinforcing is a relatively simple matter. If the stimulus is presented after a certain operant, and the operant subsequently increases in frequency, then the stimulus is assumed to be reinforcing (Bijou and Baer, 1961, p. 34). The strength of a potential reinforcer is, of course, dependent on the state of deprivation (or satiation) of the organism in regard to that particular reinforcer.

Bijou and Baer (1961, p. 42) emphasize that relatively few reinforcers, positive or negative, will work for everybody. Each individual may be "reinforceable" by a different list of stimuli. They also make the point that no new response is created by reinforcement, merely, an already existing response is strengthened. A response can be conditioned by reinforcing consequences, but it must occur in order to have consequences. Reese (1966, p. 51) says that since operant conditioning is accomplished by



reinforcement, it is essential to find an adequate reinforcer: one that can be presented immediately following a response, one that can be presented without satiation, and, as a practical measure, one that is in reasonable supply.

*Extinction and punishment.* The weakening of a response by consistently giving it only neutral stimulus consequences, until it falls in strength to its operant level, is called extinction of the response. When the response has fallen to its operant level and stabilized at that strength, it is said to be extinguished (Bijou and Baer, 1961, p. 39).

Skinner (1953) defines punishment in two ways: (1) the presentation of a negative reinforcer or aversive stimulus, and, (2) the withdrawal of a positive reinforcer. Azrin and Holz (1966, p. 381) state that punishment is a process by which an immediate presentation of a stimulus following an act reduces the probability of the occurrence of that act. Punishment is defined, therefore, solely by its effect upon behavior: it occurs only if some behavior has been successfully reduced. Punishment procedures may be used so effectively that they weaken a response well below its operant level. However, afterwards when the response produces neutral stimuli, the operant will rise in strength to its operant level (recovery).

*Scheduling.* Reese (1966, p. 15) says that the







quickest way to establish behavior is by reinforcing each occurrence of the response. This is not, however, the most economical way to maintain behavior. Once it has been conditioned, behavior is usually reinforced intermittently.

Behavior can be reinforced according to many schedules. The schedule with which the reward follows the response is basically either "fixed" or "variable". With a fixed schedule, reward is given after a constant number of responses (fixed-ratio) or a constant interval of time (fixed-interval). With a variable schedule, reward is given after varying numbers of responses or varying amounts of time (the subject is never sure when reward will be delivered) (Baumeister, 1967, p. 193).

*Discrimination and generalization.* Walker (1967, p. 103) elaborates on a basic procedure for discrimination learning. The procedure is to present one stimulus which elicits a response which is immediately reinforced. Simultaneously, another stimulus is presented which elicits a response but which is not reinforced. Reese (1966, p. 10) calls this procedure differential reinforcement.

When a particular stimulus has come to control a response, similar stimuli will, to the extent of their similarity, also control this same response. This is called the principle of stimulus generalization (Staats, 1964, p. 69).



*Shaping.* Shaping consists of reinforcing responses which are sequentially closer and closer approximations of the desired behavior. During shaping, reinforcement not only strengthens the particular response that is reinforced, but also increases the likelihood that a closer approximation will occur (Reese, 1966, p. 13).

Shaping is necessary, says Staats (1964, p. 68), because many responses occur so infrequently that it would be highly impractical to wait for their occurrence so that they could be reinforced. However, operant learning can take place in a gradual manner. A response which ordinarily would not occur in finished form can be "shaped" by first rewarding gross approximations to the desired response. Since a response is actually a member of a class of similar responses, the class will be strengthened as well as the individual response (generalization). Then the particular response desired is differentially reinforced until it is discriminated from similar responses.

Skillful shaping consists of selecting the right responses to reinforce and in knowing how long to reinforce each approximation before moving on to the next. If progress is too slow, the subject may satiate, or, a given approximation may become so firmly established that there is little chance for other responses to occur. If progress is too rapid, demanding an approximation which is not likely to occur, the behavior that has been shaped will begin to



extinguish, and this requires backtracking to an earlier approximation and working up again (Reese, 1966, p. 14).

*Some Further Considerations of Behavior Modification*

*Immediate contingency.* Ross (1967, p. 276) states that the basic principle of behavior modification based on operant conditioning is that behavior is a function of its consequences. The probability of a behavior recurring depends on what has followed that behavior when it has previously occurred. Behavior can thus be strengthened or weakened by manipulating what happens after it occurs. The efficiency of such behavior modification depends on the degree to which we can control the consequences (i.e., create outcomes which reinforce desired behavior).

The idea that reward or lack of reward regulates behavior is nothing new. The new and highly significant contribution of operant conditioning is its stress on the importance of the temporal relationship between the response and the reinforcement. This relationship is called *contingency*, and the basic principle of operant conditioning demands that the consequences be contingent upon the occurrence of a specified behavior. Positive reinforcers, for example, are presented if, and only if, the behavior that one is seeking has occurred.

Quay, Werry, McQueen and Sprague (1966, p. 511) say that reinforcement must follow *immediately* upon the behavior



under study. This principle of immediate contingency is probably one of the most crucial factors in behavior modification and yet probably one of the least appreciated among those working with children.

*Premack's principle.* Premack (1959) has added a relevant dimension to the task of formulating empirical behavior modification techniques. Stressing the importance of behavioral consequences, Premack stated the following principle: "Any response A will accelerate any other response B, if and only if the independent rate of A is greater than that of B" (Premack, 1959, p. 220). Briefly interpreted, the Premack principle merely states that any behavior is strengthened or accelerated when followed by behavior which occurs at a high frequency or rate. For example, a child will eat his vegetables in order to be able to watch TV. Haring and Lovitt (1967, p. 18) would call eating vegetables a "low probability behavior" and watching TV a "high probability behavior".

*Eliminating undesirable behavior.* Undesirable behavior is eliminated and desirable behavior substituted through a process of differential reinforcement. Differential reinforcement means simply that when undesirable behavior occurs it is not rewarded, and when desirable behavior occurs, it is rewarded. A response may be weakened through differential reinforcement by causing:







- (1) the presentation of a negative reinforcer,
- (2) the loss of a positive reinforcer,
- (3) neutral consequences.

If a response is followed by neutral results, the response decreases in frequency (extinction). When a response results in the presentation of aversive stimuli or the loss of a positive reinforcer, the response is being punished.

Punishment may immediately stop a behavior and reduce its occurrence for a long period of time (Azrin, 1960; Masserman, 1946). Punishment of specific responses or behaviors is informative to the child; it teaches him that such a response is incorrect (Marshall, 1965). Punishment may also be instructive to other children -- children are less likely to imitate behavior which they have seen punished (Bandura, 1965a; Walters and Parke, 1964, Walters, Parke, and Cane, 1956).

Certain undesirable side reactions may occur as a consequence of punishment. Generalization will cause the organism to respond in a similar manner to any stimulus which is like the one that was present when he originally learned the behavior (Watson and Raynor, 1920). If possible, an organism will escape (withdraw) from a punishing situation (Azrin, Hake, Holz, and Hutchinson, 1965). Individuals may also become aggressive in response to punishment (Azrin and Holz, 1966). Investigators (Bandura and Walters, 1963; Bandura, 1965b) have indicated that even though others are



not likely to immediately imitate an act which has been punished, they may remember the act only too well and imitate it in the absence of an authority figure. On the other hand, a child who is punished may become a negative stimulus to others and may be avoided or ridiculed (Mayer, Sulzer, and Cody, 1968, p. 325).

Reinforcement (positive or negative) is more effective if it is applied every time the particular behavior occurs and if it follows the behavior as closely as possible (Azrin, 1956; Azrin, Holz and Hake, 1964; Zimmerman and Ferster, 1963). Extended periods of punishment should be avoided or the effectiveness of the punishment will be reduced (Azrin, 1958). For maximal effect, punishment should be introduced at full intensity, rather than in gradually increasing amounts (Azrin, Holz, and Hake, 1963; Masserman, 1946), and escape after punishment should be impossible (Azrin, Hake, Holz, and Hutchinson, 1965).

Punishment is but one aspect of differential reinforcement. If punishment is used properly, it reduces the occurrence of a specific behavior quickly and for a long period of time. However, there should always be an alternative shown to the child; that is, he should be taught behavior which will be rewarded or which is incompatible with the punished behavior (Reese, 1966, p. 42). It will then be this latter behavior that is strengthened through



use and reinforcement while the other inappropriate behavior falls into disuse.

*An Objective Classroom Technique*

Initial responses to the presentation of behavioral principles and behavioral modification techniques might be as follows: I use these procedures in my classroom every day; they are not new at all. Homme and Tosti (1964) have the most adequate reply to this response:

If it is not the lack of consequences which makes behavioral control difficult, one might reason, it must be the lack of knowledge of the principles of behavioral control. If one attempts to verify this, he will find that this, too, is incorrect. If given a test on the principles so far discussed, most people would score very high. It is not a lack of consequences or a lack of knowledge about how to use them. The difficulty can be traced to a failure to *systematically* apply what is known. It is not only that behavioral principles are not systematically applied, they are, if applied at all, only sporadically applied (p. 4).

The importance of consistency and systematic application cannot be overemphasized. However, in order to be systematic in the dispensing of reinforcement, the work for each child must be extremely well planned; that is, individual programmed instruction is a necessity for behavior modification in a classroom. But programmed instruction should not be regarded as a technique that can stand alone. This is especially apparent when the pupils involved are not motivated to learn and have not acquired the prerequisite attentional and study skills (Wolf, Risley, and Mees, 1964).





Lovitt (1968) lists the following as being the basic characteristics of operant methodology applicable to the classroom: operational, objective, continuous, systematic, functional, and general. They can be defined as follows:

*Operational:* Behavior must be defined and specified. Such terms as "hyperactivity" or "slow learning" must be described in behavioral terms and their rate of occurrence noted if observations are to be reliable and useful.

*Objective:* The quantification of behavioral data eliminates the either/or aspect of behavior and places events sequentially along a continuum.

*Continuous:* Continuous assessment is more sensitive to a child's academic progress than is periodic testing at the end of a unit.

*Systematic:* Many variables may affect the child's learning rate; therefore, the teacher must constantly discover variables in the environment, following as well as preceding a child's behavior, that might affect the occurrence of some academic behavior.

*Functional:* By manipulating one variable or environmental component at a time, the teacher is able to evaluate the relative effects of her total programming efforts.

*General:* Operant procedures may be used in a school not only by teachers but by all school personnel coming in contact with the child (p. 286).

The description of behavior in operational terms is an absolute necessity for programmed learning. When the behavior is specified, the teacher can evaluate progress and determine what steps are necessary to reach final goals.





### *Related Research*

#### *Behavior Modification in Special Class Situations*

Behavior modification techniques have been used with various types of special class or problem children. Dyer (1968) successfully used food as a primary reinforcer for academic behavior with an emotionally disturbed twelve-year old girl. Hewitt (1967) describes an engineered classroom using behavior modification techniques with emotionally disturbed children. Williams (1959) cites a study in which tantrums were eliminated in a young boy by extinction procedures. Behavior modification techniques have been also used successfully with learning disabled children (Lovitt, 1968; Nolen, Kunzelmann, and Haring, 1968).

Birnbrauer, Wolf, Kidder and Tague (1965) used a token reinforcement system with retarded pupils and demonstrated the effectiveness of the procedure by removing the tokens for a period of time. During this time, disruptive and nonacademic behavior generally increased. Birnbrauer and Lawler (1964) used candies as reinforcement and then were able to substitute poker chips with a class of mentally retarded children.

O'Leary and Becker (1967) worked with an adjustment class using a rating system which was converted into points exchangeable for various prizes. Hewitt (1966, 1969) has described a hierarchy of tasks for educationally



handicapped children, starting with the dispensing of primary reinforcers and ending with self-motivation. Children would be at different levels in the various tasks and therefore would require individualized programs (Hewitt, 1964).

### *Various Approaches*

Token economy takes many forms. The principles are constant, but methods must be adapted to individuals -- individual classrooms, teachers, and pupils. Patterson, Shaw and Ebner (1969, p. 18) suggest that the method used must have a number of special characteristics when designed for the classroom:

- (1) minimal disruption of classroom activities,
- (2) modest cost of professional time,
- (3) control should be "transferred" to the natural consequences of the classroom (social reinforcement).
- (4) low response cost to teachers.

Mattos, Mattson, Walker and Buckley (1969) used a work card system on which points were recorded for academic and social behavior. A work card may be used on a daily, weekly, or even monthly basis, depending on how many points may be earned in a day. The points were exchanged for free-time which could be spent in a high-interest room adjoining the classroom (containing science equipment and crafts). A "time-out" procedure was used as well. "Time-out" from opportunities to engage in positively reinforcing



activities was used effectively to eliminate disruptive behavior. Time-out consisted of placing the child in "isolation" for a period of time (during which he engages in no work activity and thus cannot earn points). The program significantly increased academic production. Aversive consequences for not completing academic assignments were added when the program was established and this increased academic production another ten per cent.

Birnbrauer *et al* (1965) used a token system similar to green stamps. Pages of different value could be filled with check marks and then exchanged for edibles, inexpensive toys, and school supplies.

Birnbrauer and Lawler (1964) give the following as advantages of token reinforcement:

- (1) Children vary in what is reinforcing to them; they can exchange tokens for what they like best.
- (2) Tokens are economical.
- (3) Tokens do not interfere with other activities.
- (4) Children may be taught to "save for the future".

McKenzie, Clark, Wolf, Kothera and Bensen (1968) obtained the cooperation of parents of children with learning disabilities. Allowances had to be earned by academic production; certain marks were worth certain amounts of money.

Valett (1966, p. 187) suggests that wrong answers not be checked in any way and that these become the basis



for individual work with the child in order that he may understand and correct his errors. His program included the use of poker chips, an award party at the end of the week, and a chart system which allowed the child to gain various "honors" through accumulation of points.

Group points may be given out as well as individual points (Barrish, Saunders and Wolf, 1969; Hotchkiss, 1966). O'Leary and Becker (1967) gave group points for being quiet during the time that ratings were being done. Mattos *et al* had a group reinforcement time for half an hour each morning. During this time, a clock ran as long as all children were engaged in task-oriented behavior. When talking, etc., started, the clock was reset. "Minutes" were translated into group points. Group points could be exchanged for various group activities -- extra recess, games, parties, and field trips. Sulzbacker and Houser (1969) decreased the frequency of an undesirable behavior in an EMR classroom through group contingent consequences. Each time the behavior occurred, the group lost one minute of a special ten-minute recess.

The effects of social reinforcement (attention, praise, etc.) have been described in various studies using this technique to modify behavior (Becker, Madsen, Arnold and Thomas, 1967; Broden, Hall, Dunlap and Clark, 1970; Harris, Wolf and Baer, 1964; Thomas, Nielsen, Kuypers, and Becker, 1968; Zimmerman and Zimmerman, 1962). Thomas,







Nielsen, Kuypers, and Becker (1968) warn that reinforcement is not enough to increase academic success in a handicapped child. Adequate remedial instruction must accompany the reinforcement situation.

In summary, it seems that the application of operant principles and techniques in the classroom should conform to certain specifications. A prime consideration in the decision to implement a program of behavior modification is whether or not such a program is economical in terms of equipment, materials, and response cost on the part of the professionals involved. It can be seen from the foregoing introductory literature that various adaptations of token economies may be made. However, it seems that an adequate grounding in theoretical principles is a requisite to their creative application in the classroom. The ensuing study is designed in accordance with the above cited conditions.

### *The Study*

#### *The Direction of the Study*

From the related research, it may be seen that behavior modification techniques have been successfully applied in a variety of special class situations. However, the emphasis in the majority of the studies reviewed has been on the application of the techniques in the classroom rather than on the training of teachers. In any case, to



this investigator's knowledge, systematic attempts at training have not been reported.

Tharp and Wetzel (1969, p. 47) stress the importance of training mediators (e.g., teachers, parents) when they say, "In the majority of situations the most powerful reinforcers are in the hands of someone other than the professional consultant". Patterson (1969, p. 131) argues that it is logical to train those members of the social environment most relevant to the child. In fact, one of the most important attributes of these techniques is the fact that they can be taught to teachers (Clarizio and Yelon, 1966, p. 273).

Knowledge of techniques, however, is not enough. As Hewitt (1967) states:

Some teachers are so desperate for ideas and directions to increase their effectiveness that they react to the superficial aspects of the design and somewhat randomly apply them in their classrooms .... Behavior modification theory is a systematic theory, not a faddist theory based on gimmicks. To be useful, it must be understood and adhered to systematically, not sporadically applied (p. 466).

Kuypers, Becker, and O'Leary's (1968) description of "how to make a token system fail" vividly supports the contention that teachers must be educated in the principles of behavior modification as well as in the application of techniques.



### *Scope of the Study*

*Population and areas of investigation.* Special classes for educable retarded children (Opportunity Classes) are often populated with children exhibiting behavior problems which seriously interfere with academic performance. Thus, it seems that teachers of such classes would benefit from training in operant principles and techniques. Accordingly, the sample for this investigation consisted of one Junior Opportunity Class teacher and her students.

Since many special class students demonstrate a low rate of attention to academic tasks (Werry and Quay, 1969; Hamerlynk, Martin, and Rolland, 1968), time spent in academic behavior appeared to be a worthwhile target for behavior modification techniques. Another area of interest was that of student-teacher interaction: that is, time spent in productive explanation or illustration, as contrasted with time spent disclaiming or criticizing disruptive behavior, was selected for scrutiny.

*Design of the experiment.* In accordance with Gardner's (1969) specifications for adequate research design in behavior modification studies, the present investigation attempted to (a) specify independent variables, (b) assess the dependent variable both directly and indirectly, (c) achieve adequate control, and (d) present



both individual and group findings. The study was continued as long as possible (until the end of the school term) in an attempt to provide adequate follow-up (Baer, Wolf, and Risley, 1968; Gelfand and Hartmann, 1969; Smith and Neisworth, 1969).

This investigation employed all subjects (both teacher and students) as their own controls. Outside controls were not used because it was considered impractical to attempt to match all behavioral characteristics. So unique is the configuration of physical and learning disabilities of special class children that any such control would have been superficial, at best (e.g. see Risley, 1969, p. 112).

An acceptable design alternative was found in the following procedure: all criterion measures were administered three and one-half weeks prior to commencement of treatment, and again two days before commencement of treatment. This period of time and the measures so taken constitute the equivalent of running co-terminous measures with a separate control group. The advantages inherent, are that the control perfectly matches the experimental group in all characteristics (Risley, 1969).

### *Hypotheses*

Certain hypotheses arise as a result of the foregoing review:





- (1) A teacher educated in operant technique will bring about an increment in academic behavior, and a corresponding decrement in non-academic and disruptive behavior.
- (2) A teacher educated in operant technique will demonstrate a decrement in time devoted to disciplining and criticizing student behavior.
- (3) A teacher educated in operant technique will bring about an increment in academic achievement, as measured by the Wide Range Achievement Test.



## CHAPTER III

### PROCEDURE AND DESIGN

#### *Sample*

##### *The Teacher*

One teacher from a Junior Opportunity Class (Edmonton Public School System) was involved in the training program. The teacher was not selected by the experimenter because of any particular attributes; rather, a request was made to the Special Services Division for an Opportunity Class teacher who would be willing to assist in a research project.

The teacher concerned had completed two years in Education at the University of Alberta ten years previous to the experiment. By self-admission, she was not familiar with the principles of operant conditioning or behavior modification. She had taught school for a total of five years: three years in grade two and two years at the Cerebral Palsy Clinic, and, after a five-year absence, she returned to teaching this year.

##### *The Student Subjects*

The following criteria for placement in an Opportunity Class were taken from a Special Education Newsletter distributed by the Edmonton Public System:

The Opportunity Classes in the Edmonton Public School System were established to meet the educational needs of



students falling generally into the IQ range 50 to 75 as measured by an individual test such as the Stanford-Binet, the WISC, or the WAIS. In addition to the formal test indications, the student must be showing some signs of distress in the normal class situation, or, in the case of a pre-school child -- have been assessed as incapable of performing in a regular class situation (Vol. I, (7), 1968).

The twelve full-time students (three students received some instruction in other classes as well as in the Opportunity Class) are described in Tables 1 and 2. Only the twelve full-time students were considered for the purposes of this experiment. Final analysis had to be restricted to eleven students, as one child discontinued because of Hepatitis.

TABLE 1

DESCRIPTION OF STUDENTS BY AGE, SEX, AND IQ  
(TEST ADMINISTERED BY SCHOOL PSYCHOLOGIST)

Student	Sex	CA	IQ	Test Given and Date Administered
B.B.	M	10-4	68	*S-B, Sept., 1966
W.C.	M	10-11	77	*S-B, Nov., 1969
L.D.	F	11-9	60	WISC, Mar., 1966
S.H.	F	9-11	73	WISC, Nov., 1969
J.J.	M	11-3	67	WISC, Mar., 1968
D.J.	M	12-0	67	WISC, Nov., 1969
P.K.	M	12-0	71	WISC, Nov., 1969
R.K.	F	10-1	76	WISC, Nov., 1969
V.P.	F	11-8	65	WISC, Nov., 1969
R.R.	M	10-8	75	WISC, Feb., 1970
M.S.	M	10-0	51	*S-B, Sept., 1966
L.T.	M	12-0	75	WISC, Nov., 1969

\*S-B stands for Stanford-Binet, Form L-M



TABLE 2

DESCRIPTION OF STUDENTS IN TERMS OF FAMILY AND  
SCHOOL BACKGROUND

Student	Father's Occupation	Children in Family	Years in School	Years in *Oppt.
B.B.	Trucker	2	4	3
W.C.	Construction	4	5	3
L.D.	Labourer	6	6	5
S.H.	Disabled	11	4	3
J.J.	Salesman	7	4	3
D.J.	Horse trainer	2	5	4
P.K.	Welder	3	6	1
R.K.	Labourer	3	4	3
V.P.	Post Office	3	5	3
R.R.	Machinist	2	4	3
M.S.	Cabinet maker	5	4	3
L.T.	Labourer	5	5	3

\*Oppt. stands for Opportunity Class

*Instruments*

The instruments employed in this study were: the Wide Range Achievement Test, the Flanders Interaction Analysis, and the Stanford-Binet, Form L-M. A brief description of each instrument follows.

*Wide Range Achievement Test*

The Wide Range Achievement Test (WRAT) is intended as a convenient tool for the study of the basic school subjects of reading (word recognition and pronunciation),





written spelling, and arithmetic (Jastak and Jastak, 1965). Each of the subtests is divided into Levels I and II. Level I is designed for use with children between the ages of 5-0 to 11-11. Level II is intended for persons from 12-0 to adulthood. Altogether, the three subtests take between twenty and thirty minutes to administer (individually). The three subtests at both levels are:

- (1) *Reading*: recognizing and naming letters and pronouncing words.
- (2) *Spelling*: copying marks resembling letters, writing the name, and writing single words to dictation.
- (3) *Arithmetic*: counting, reading number symbols, solving oral problems, and performing written computations.

The WRAT has been found to have validity in the diagnosis of reading, spelling and arithmetic disabilities in persons of all ages; and, in the determination of instructional levels in school children (Jastak and Jastak, 1965). A reliability estimate reported in the test manual and based on the split-half procedure was .93.

*Stanford-Binet, Form L-M*

The Stanford-Binet Intelligence Scale measures general ability rather than specific or related groups of abilities. It contains an age scale format, operating on the assumption that general intelligence is a trait which develops with age -- hence the use of age standards of performance. The 1960 Stanford-Binet contains at each age



level six different items and an alternate (to be used if one item is rendered inadmissible). Content varies from age to age. Between ages 6-12, items are largely verbal in nature. The Stanford-Binet norms cover a much more extensive range of ages and IQ levels than do most other intelligence tests, so that scores over a very wide range are more readily interpretable. The Binet was chosen as a measure of intelligence in this study in order to monitor the importance of the intellectual variable in behavior change. Robinson and Robinson (1965, p. 416) indicate that the Binet is particularly useful with low-functioning children.

#### *Flanders Interaction Analysis*

Interaction analysis may be used as a pre- and post-measure of change in a teacher's behavior. The Flanders system is a system of interaction analysis concerned with verbal behavior only, primarily because it can be observed with higher reliability than can non-verbal behavior. The assumption is made that the verbal behavior of an individual is an adequate sample of his total behavior. In the Flanders system of interaction analysis, observation of all teacher statements are classified first as either indirect or direct. All statements that occur in the classroom are categorized in one of three major sections: (1) teacher talk (categories 1 through 7), (2) student talk (categories 8 and 9), and, (3) silence or confusion (used



to handle anything else that is not teacher or student talk).

These larger sections of teacher and student verbal behavior are further subdivided in order to make the total pattern of teacher-pupil interaction more explicit. The two subdivisions for teacher verbal behavior, *indirect* and *direct* teacher talk, are divided again into still smaller categories. Direct teacher talk is divided into three categories: *lecturing*, *giving directions*, and *criticizing, or justifying authority*. The last category mentioned (criticizing, or justifying authority) is of particular interest in this project. This category is summarized as consisting of: statements intended to change student behavior from non-acceptable to acceptable patterns, "bawling" someone out; stating why the teacher is doing what he is doing; and, extreme self-reference. It was expected that the percentage of time devoted to these activities would decrease as the result of a program of behavior modification in the classroom (simultaneously, the indirect teacher talk category of "praises or encourages" would show a percentage increase). A more elaborate outline of Interaction Analysis may be found in Amidon and Flanders (1963).



### *Other Evaluative Procedures*

#### *Recording of Time Spent in Academic Behavior*

A technique was used to determine the amount of time spent in academic behavior by individual students. The technique requires that students be observed for a number of randomly selected ten-minute time periods. When the student is engaged in academic behavior, a stop-watch runs. As soon as the student ceases academic behavior, the watch is stopped. Appendix A contains the criteria used to distinguish academic and non-academic behavior.

#### *Administrative Procedures*

Measures from the Wide Range Achievement Test, the Flanders Interaction Analysis, and the recording of time spent in academic behavior were collected during the following phases:

- (1) Three and one-half weeks prior to the training program (Baseline 1),
- (2) Immediately before the teacher training program (Baseline 2),
- (3) Three and one-half weeks after the training program (Post-training 1).

The Stanford-Binet, Form L-M was administered to each student individually two weeks before the teacher training program.





*Wide Range Achievement Test (WRAT)*

The spelling section of the WRAT was administered in a group situation. Reading and arithmetic sections were administered individually (these procedures were followed in each phase).

*Flanders Interaction Analysis*

Two twenty-minute sessions of Flanders Analysis were recorded by the experimenter during each phase. The Interaction Analysis was always done during a group language lesson using activities from the Peabody Language Kit, Level 2 (American Guidance Service, 1966). The teacher was not aware that this measure was being taken.

*Recording of Time Spent in Academic Behavior*

Each student was observed for fifteen randomly selected ten-minute sessions: five observations were done during each of the three phases mentioned above.

Before the second set of observations was taken, an independent rater was trained by the experimenter, using five ten-minute observation sessions for training. Ten observations were subsequently taken to establish inter-rater reliability. Reliability, determined by analysis of variance, (Winer, 1962), was calculated to be .98.

The observer collected data in the second and third phases independently of the experimenter, but during the same time periods. Ratings were only done when the students were



supposed to be engaged in academic work at their seats or at an assigned position in the classroom. Academic work was determined by the teacher to be: reading, writing, spelling, arithmetic, health, and language. The two raters sat at opposite sides of the room and took observations randomly on students in the two closest rows (there were four rows in all). The raters switched positions at the end of each hour.

Each student was observed for a total of fifty minutes during each phase. Cobb (1969) has indicated that if school settings are sampled systematically, (desk work, group work, playground) a stable estimate for any one of these behavioral events may be obtained in about thirty minutes for any given child.

#### *Follow-up*

Follow-up measures (Post-training 2) were done using the Wide Range Achievement Test and recording of time spent in academic behavior during the last week in the school year. When school ended, the program had been in operation in the classroom for seven weeks.

The Flanders Analysis was not done at this time because it had been necessary to inform the teacher after Post-training 1 that this measure was taken in order to obtain permission to use the data.



### *Analysis*

The analysis consisted of examining through analysis of variance, the data gained from the observation sessions and the Wide Range Achievement Test. The data from the Flanders Interaction Analysis was examined for percentage differences.

The analysis of variance was performed to ascertain if differences existed between pre- and post-measures. Criterion significance was set at the .05 level. Pearson Product-moment correlations were calculated between Binet values and gain scores made in time spent in academic behavior, and in the reading, spelling, and arithmetic subtests of the Wide Range Achievement Test.

### *The Teacher Training Program*

The teacher training program consisted of three main parts: (1) preparatory reading assignments, (2) a one day program at the University, and, (3) preparation of materials and classroom facilities.

The teacher was instructed to "practice data collection" on her last teaching day before the training program. A wrist counter was used to record the number of times an undesirable behavior was demonstrated by a particular student (for instance, the number of times that John talked out of turn). Recording was done during a specified period of time (one hour). The purpose of the



data collection was two-fold: (1) to give the teacher experience in recording, and (2) to encourage objective observation (the basis for behavior modification).

The reading assignments (Appendix B) were done the day before the program at the University. The teacher estimated that she spent approximately five hours completing these assignments. The "pre-program" reading served as an excellent basis for discussion and greatly reduced lecture time.

The one day program at the University consisted of lectures, discussions, films, and video-tapes. In order to keep the description of this program clear yet brief, the eight major steps have been summarized below:

- (1) A test based upon *Living With Children: New Methods for Parents and Teachers* (Patterson Guillon, 1968) was devised by the experimenter (Appendix C). Immediate administration and correction of the test resulted in discussion of the major concepts presented in the book. Time: 25 minutes.
- (2) A video-tape was shown in which a young retarded child was taught self-help skills in a one-to-one situation through operant techniques. A description of this video-tape is given in Appendix D. Discussion followed. Time: 65 minutes.
- (3) A summary of the major principles was given by the experimenter, in lecture form (Appendix E). Questions were answered throughout the lecture. Time: 30 minutes.
- (4) The two articles designated as part of the reading assignment were discussed in accordance with the assignment given (Appendix B). Time: 30 minutes.







- (5) A film, *Controlling Behavior Through Reinforcement* was shown to demonstrate different types of schedules of reinforcement. A description of the film is given in Appendix F. Discussion followed. Time: 25 minutes.
- (6) A video-taped interview involving the experimenter and two teachers who had used operant techniques in their classrooms was presented. The interview followed the outline in Appendix G. A tape recording was made from the videotape to ensure permanent record. Time: 60 minutes.
- (7) The methods of token economy (Appendix H) were discussed with the teacher's own classroom in mind. Rewards which might be suitable were suggested (Appendix I). Time: 30 minutes.
- (8) A planning session (involving the experimenter and teacher) lasted 90 minutes. In this session, techniques, rewards, recording systems, etc., were decided upon. A description of classroom procedures follows.

One full day was devoted to purchasing rewards and other necessary materials, and to rearranging the classroom to create a time-out room and specified deposit areas for educational supplies (e.g. educational games, reading books, art supplies). A diagram of the classroom after rearrangement is presented in Appendix J. The work of each student was individualized by means of a folder containing assignments commensurate with specific needs. A record of the time spent in preparing for the program, in training, and in consultation, for both the teacher and the experimenter, is given in Appendix K.

#### *Classroom Procedures*

*Individual folders.* The work for each student was



individualized. Each student was given a "cubby hole" (some distance from his desk) which contained all his books and his own work folder. A job sheet (Appendix L) outlined assignments to be completed during the day. As each assignment was completed, it was placed under the folder for correction during the teacher's marking time. All worksheets and special instructions (such as practicing spelling or arithmetic with one of the educational games) were in the folders.

*Point system.* Points were given for certain specified activities and recorded on a weekly point sheet (described in Appendix M) by the teacher (using a purple felt pen, and a pink felt pen to cancel "spent" or already exchanged, points). "Ready to work" behavior was shaped in the following manner: during the first week, the students were immediately given a point when they sat at their desks quietly within five minutes of the bell, whether at nine a.m., after morning recess, or at one p.m. This time was gradually shortened to two minutes after the bell, where finally, the students had to be seated, have their first assignment on their desks, and remain quiet, to receive their points.

Academic work was also shaped. At first, completed assignments were worth points no matter when they were finished. As the program progressed, "bonus" points were given for completing assignments during the specified time



period. Finally, points would be given for certain subjects only if they were finished during the time specified (for instance, arithmetic points would be earned only between 10:45 and 11:15). The point sheet was the property of the student, and came to the teacher only when marking was being done.

*Group points.* During the teacher's marking time, from 11:30 until 12:00, students had an opportunity to gain group points. The half hour was divided into three ten-minute sections. For each ten minute session that no disturbance (unnecessary noise, talking, etc.) occurred, one group point was awarded. These points were recorded on a group point chart visible to all students. One group point could be exchanged for five minutes of "free time" (e.g. early dismissal, extra recess). One sees the attempt to use the Premack principle and, at the same time, use a procedure that costs little or nothing and involves no aides or apparatus.

*Exchange of points.* Points were exchanged at 2:30 each day (the students were dismissed at three). At this time, the teacher took "orders" on an order sheet. Those students who wished to buy free time (one point bought five minutes) were given this time immediately. They could go to the back of the room to play quiet games with other students, draw, paint, etc. Those who wished to exchange



for tangible rewards (which were on display in a special box at the front of the room) put in their orders and received their rewards as they left the classroom upon dismissal.

*Methods of dealing with undesirable behavior.* Small deviancies (talking out of turn, getting out of seat unnecessarily) were ignored. The teacher recognized and praised competing behaviors (raising hand, staying in seat). Major deviancies (fighting, yelling in anger at another student or the teacher, swearing) were dealt with by a "time-out" procedure. When a student committed a major deviancy, he was given a five-minute egg timer and sent to the time-out area -- an unused cloakroom containing nothing but one chair. This area was behind the teacher's desk and removed from the other students. No work was done in the time-out area. When the five minutes were up (a sand egg timer made cheating impossible) the student placed the timer on the teacher's desk and returned to work. Additional time-out (another five minutes) was given only if the student was misbehaving in the time-out room at the end of the first five minutes (swearing, kicking the wall, etc.).

*Summary.* The major techniques used were: individualized folders for daily work; a contingent point system; rewards for academic behavior; a group point system; tangible and







social rewards; and, procedures for eliminating undesirable behavior (extinction and time-out). The teacher tried to "catch the child in the act of being good"; she rewarded good behavior and consistently gave no reward for unwanted behavior.



## CHAPTER IV

### FINDINGS AND CONCLUSIONS

For the sake of increased clarity, the results of the study are presented after restatement of each of the hypotheses.

#### *Hypothesis I*

A teacher educated in operant technique will bring about an increment in academic behavior and a corresponding decrement in non-academic and disruptive behavior.

#### *Findings*

In order to test the above hypothesis, academic behavior was measured directly using a stopwatch technique which allowed the observer to record the amount of time actually spent "on task" in a number of randomly sampled ten-minute time periods. Five such ten-minute samples were recorded for each subject at each of the four different observation times. The mean time spent in academic behavior by the group during each of the four observation periods is shown in Table 3. The figures represent mean seconds devoted to academic work in ten-minute periods (600 seconds).



TABLE 3

MEAN TIME SPENT IN ACADEMIC BEHAVIOR BY THE GROUP  
DURING THE FOUR DIFFERENT OBSERVATION PERIODS

Baseline 1	Baseline 2	Post-training 1	Post-training 2
308.54	309.00	472.36	477.73

Since confirmation of the hypothesis was contingent upon an increment in the amount of time spent in academic behavior between baseline and post-training periods, a comparison of the observed differences had to be made. Accordingly, an analysis of variance was performed on the mean time spent in academic behavior for each of the subjects during each of the four different observation periods. A summary of the analysis is presented in Table 4.

A Scheffé test between post-training means 1 (3 1/2 weeks after teacher training) and 2 (7 weeks after teacher training) revealed that the observed difference was not significant. Comparison of each of the baseline means to each of the post-training means showed significant differences beyond the .01 level.

The mean times spent in academic behavior for each subject during the four different observation periods were translated into percentages. These percentages are presented in Figure 1.



TABLE 4

SUMMARY OF ANALYSIS OF VARIANCE ON MEAN TIME SPENT  
IN ACADEMIC BEHAVIOR BY ELEVEN SUBJECTS

Sources of Variation	Sum of Squares	Degrees Freedom	Mean Squares	F Ratio	Significance
Between people	37,072	10	3,707		
Within people	355,774	33	10,781		
Treatments	304,272	3	101,424	59.08	0.00002*
Residual	51,502	33	1,716		
Total	392,846	43			

$p = .05$  df 1,10  $F = 4.96$

$p = .01$  df 1,10  $F = 10.04$

Significance level is stated for the conservative probability of F.

It is apparent from Figure 1 that all subjects made substantial gains in time devoted to academic behavior during post-training periods. Baseline percentages ranged from 33 to 67, with a class average of 52% of time being spent in academic behavior. During post-training, percentages ranged from 67 to 90, and the class average was 79%. In three and one-half weeks, the group average academic behavior increased by 27%. Measures taken after the seventh week of the program's operation indicate that gains were sustained.

Of particular interest, are the patterns of individual subjects. In Figures 2 and 3, data are presented showing all observations taken on each subject during each observation period. In the baseline periods, there is considerable





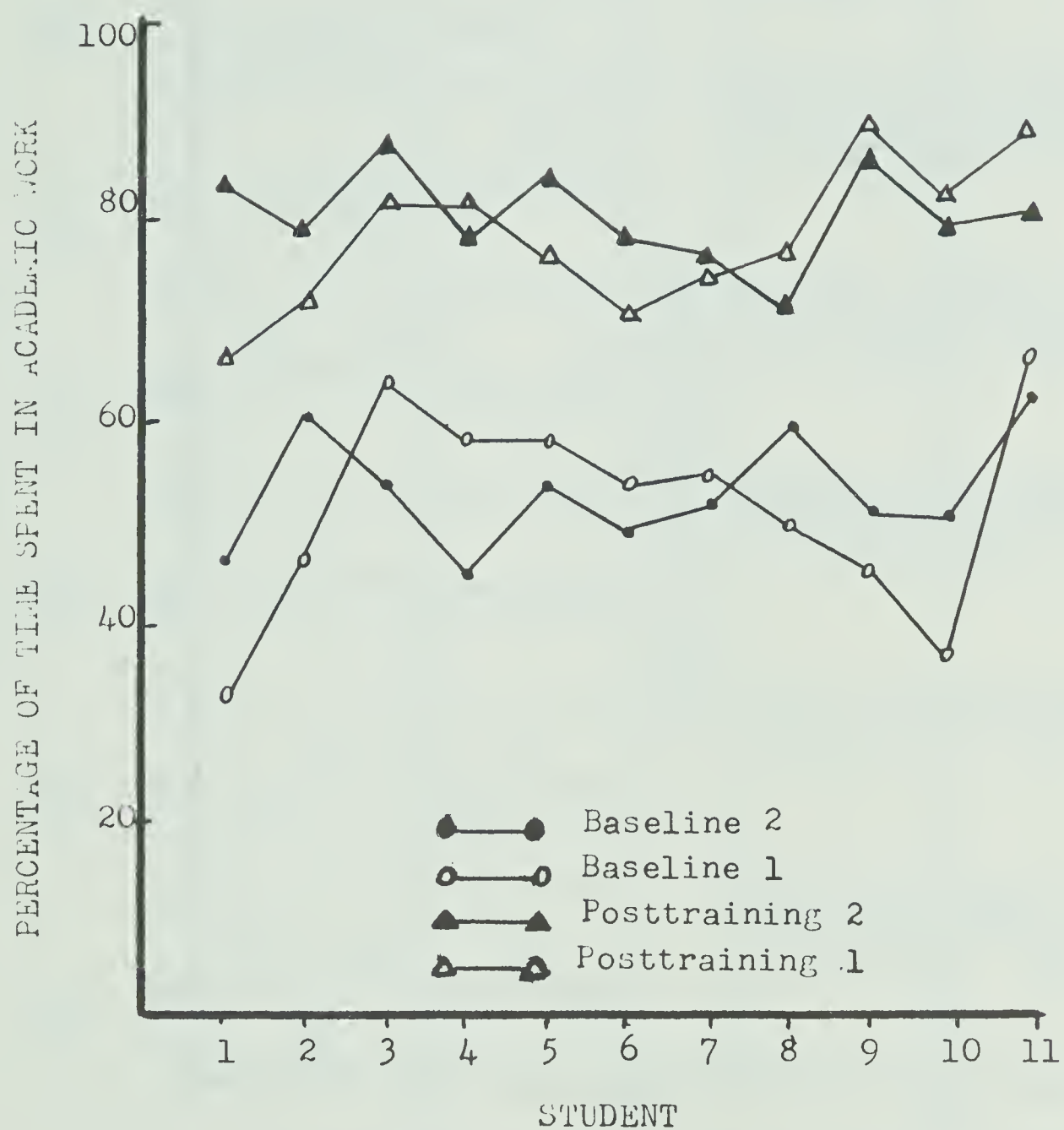


Figure 1. Mean percentage of time spent in academic work for each student during the four different periods of observation.



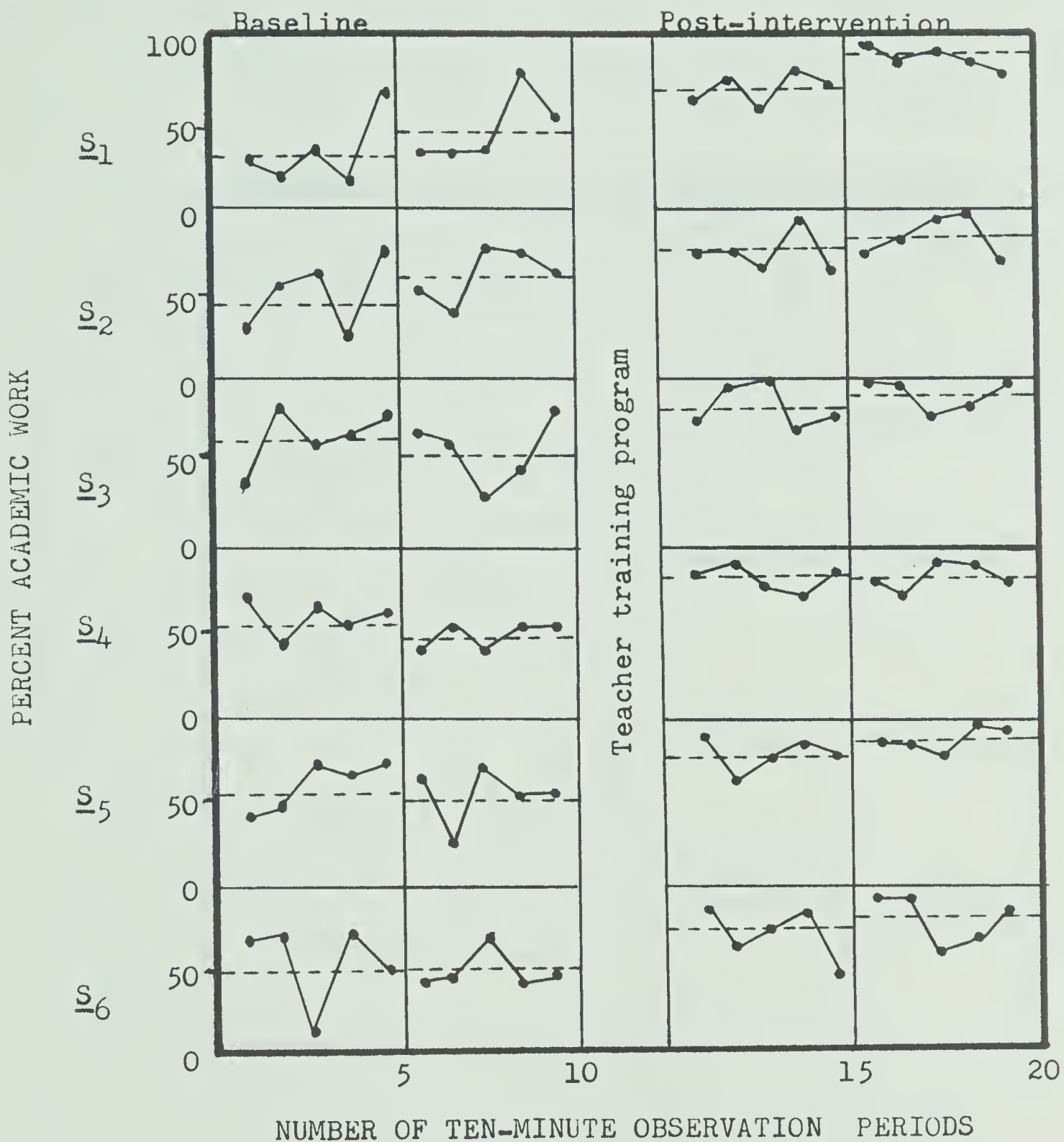


Figure 2. Percent time spent in academic work for six subjects during baseline and post-intervention phases.



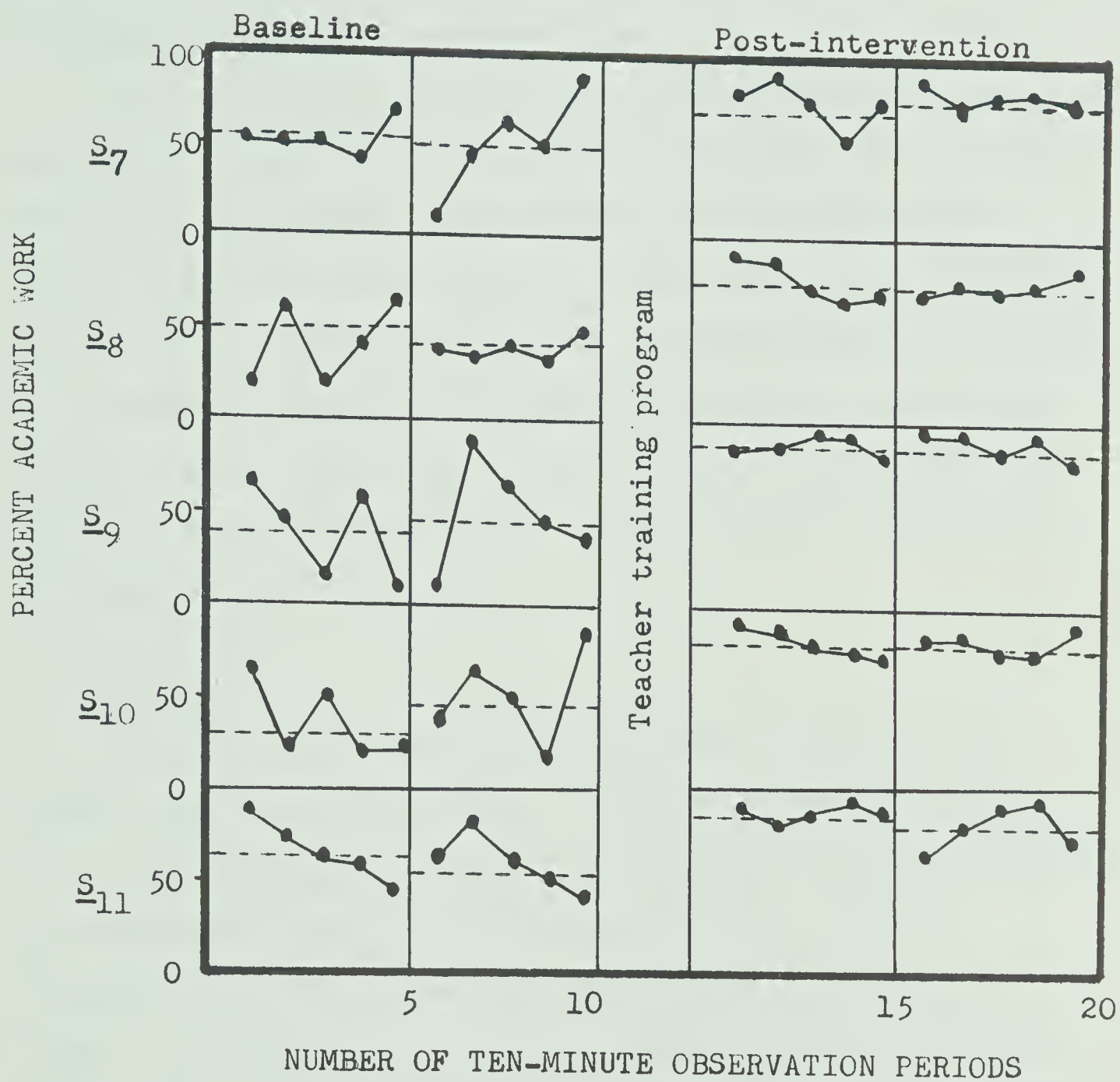


Figure 3. Percent time spent in academic work for five subjects during baseline and post-intervention phases.



variability among observations for almost every subject. That is, academic performance appears to be sporadic. During post-training (post-intervention), much less variation is evident, and without exception, a high rate of academic behavior is demonstrated.

To investigate the effects of "individuality" on gains made in time spent in academic behavior, correlations were calculated between gain scores and the variables of CA, MA, and IQ for each subject. Gain scores were obtained by subtracting mean time spent in academic behavior at baseline 2 from the mean time at post-training 2. Correlation of gain scores with CA was 0.13; with MA, -0.16; and, with IQ, the correlation was -0.20. None of these correlations was significant.

### *Conclusions*

One may infer from the significant difference in student time spent in academic behavior between baseline and post-training periods that the teacher training program was successful with the particular teacher involved. Therefore, for this situation, Hypothesis I has been confirmed. Consequently, it may be concluded that a teacher educated in operant technique will bring about an increase in academic behavior and a decrease in non-academic or disruptive behavior in the classroom.





### *Hypothesis II*

A teacher educated in operant technique will demonstrate a decrement in time devoted to disciplining and criticizing student behavior.

### *Findings*

The Flanders Interaction Analysis was employed in this study as a descriptive measure of student-teacher interaction. Statistical analysis was not performed on the data for a number of reasons. First of all, category 7, (criticizing or justifying authority) which is the category of interest in the stated hypothesis, is so obviously different in the post-training period that to apply statistical analysis to these data would appear to be superfluous. Also, even though the Analysis was always done during a group language lesson using standard materials, the actual content and duration of the interchange could not be adequately controlled. Finally, the data gained from the Flanders Analysis cannot be considered to approximate interval data. With these limitations in mind, the use of a rigorous statistical test would yield misleading or perhaps spurious results. Therefore, the data from the Flanders Interaction Analysis have been presented, for inspection, in percentage form, in Figure 4.

The teacher's use of criticism and justification of authority averages 13% in the baseline periods and 1% in the



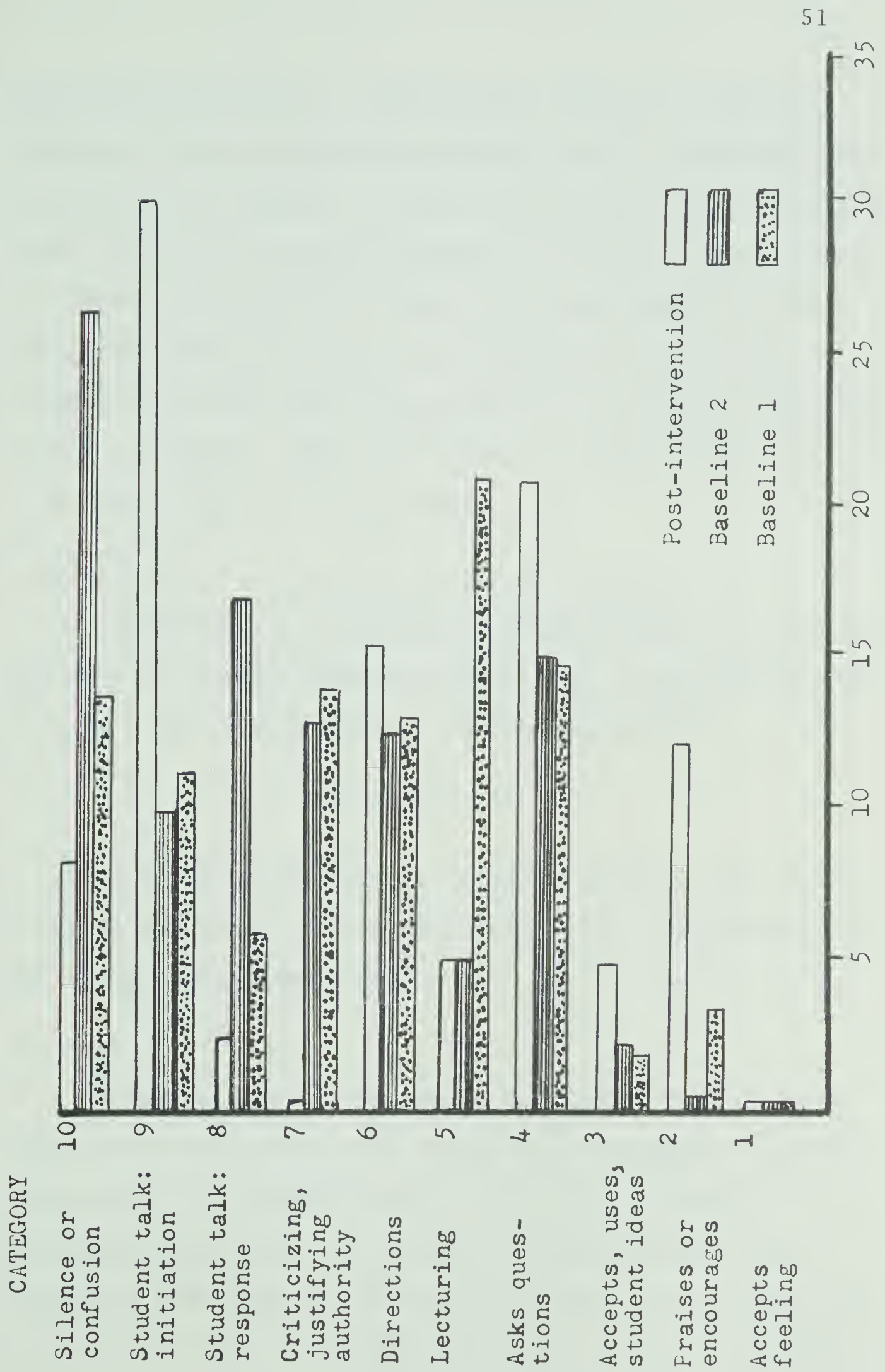


Figure 4. Flanders Interaction Analysis



post-training period. Simultaneous with the teacher's decreasing use of negative comments was the increasing use of positive statements. Praise and encouragement increased from 2.5% in the baseline periods to 12.5% in post-training 1. Other trends evident during the post-training period are: a decrease in silence and confusion; an increase in student-initiated talk (as opposed to a response solicited by the teacher); and, an increase in questioning and use of student ideas by the teacher.

### *Conclusions*

Hypothesis II has been confirmed: that is, a teacher educated in operant technique will show a decrease in time devoted to disciplining and criticizing behavior.

### *Hypothesis III*

A teacher educated in operant technique will bring about an increment in academic behavior, as measured by the Wide Range Achievement Test.

### *Findings*

Confirmation of the above hypothesis would be conceded if it were found that increases in academic achievement occurred between baseline 2 and post-training 1 observation periods. An analysis of variance was consequently performed on the data from each of the WRAT subtests at the four different observation times (a summary of





the analyses appears in Appendix N). It was found that differences existed between the mean subtest scores at the four periods of observation.

In order to determine between which administrations significant differences existed, the Scheffé test for differences between means was performed for all three subtests for all meaningful combinations. Table 5 presents a summary of these results.

TABLE 5

SCHEFFÉ TEST OF DIFFERENCE BETWEEN MEANS FOR ALL  
WRAT SUBTESTS FOR ALL ADMINISTRATIONS

Times	Reading		Spelling		Arithmetic	
	Diff.	Sig.	Diff.	Sig.	Diff.	Sig.
Baselines 1 and 2	-.1818	ns	.9091	.05	-.0909	ns
Baseline 2 and Post- training 1	3.2727	.01	.9091	.05	1.7273	.01
Post-train- ing 1 and 2	.2728	ns	1.0000	.05	.2727	ns

It may be seen from Table 5 that differences do exist between baseline 2 and post-training 1 measures for all subtests. The differences are especially apparent in reading and arithmetic. Discussion of the various trends evident appears in the following chapter.

Correlations were calculated in order to partially detract from possible counter-hypotheses, that gains made





were due to the interaction of the program with individual variables such as CA, MA, and IQ. These correlations were determined between the gain scores for each individual in each of the subtests and the above-mentioned variables (gain scores were found by subtracting baseline 2 score from post-training 2 score). These correlations are presented in Table 6. Probabilities associated with the various correlations indicated that none of the correlations was significant.

TABLE 6

## CORRELATION OF WRAT GAIN SCORES WITH MA, CA, AND IQ

Gain Score	CA	MA	IQ
Reading	0.29	-0.31	-0.29
Spelling	0.09	-0.17	-0.07
Arithmetic	0.10	0.09	-0.05

In summary, the increases in WRAT scores in reading, spelling and arithmetic over the four observation periods are presented in Table 7 (in grade level form). Significant differences were found for all subtests between baseline 2 and post-training 1. Increases in spelling were made consistently through all observation periods.



TABLE 7

MEAN GRADE LEVELS FOR CLASS IN READING, SPELLING  
AND ARITHMETIC DURING EACH TIME PERIOD

Subject	Grade level			
	Baseline		Post-training	
	1	2	1	2
Reading	2.4	2.4	2.6**	2.6
Spelling	2.3	2.5*	2.6*	2.7*
Arithmetic	2.4	2.2	2.6**	2.6

\* Increase is significant at .05 level.

\*\* Increase is significant at .01 level.

### *Conclusions*

The hypothesis that a teacher educated in operant technique will bring about an increment in academic achievement, as measured by the Wide Range Achievement Test, has been confirmed. Also, gain scores calculated in reading, spelling and arithmetic show no significant correlation with CA, MA, or IQ. Thus, with these variables, at least, there appears to be no significant interaction.

### *Summary*

The three major hypotheses of the study may be accepted. Having been educated in operant technique, the teacher successfully modified the behavior of her students and herself in the following ways:



- (1) Student academic behavior increased, and correspondingly, non-academic and disruptive behavior decreased.
- (2) The teacher's use of disciplining and criticizing decreased, and she used a greater amount of praise and encouragement.
- (3) **Student** academic achievement increased.

Noteworthy also, is that the techniques used in the classroom were effective for all students. Moreover, no significant interaction between chronological or intellectual variables with behavior change was found.



## CHAPTER V

### DISCUSSION AND IMPLICATIONS

#### *Discussion*

##### *Discussion of Results*

It would be redundant to reconsider in detail the confirmed hypotheses. However, some findings appear to warrant further discussion. For instance, the results from the Wide Range Achievement Test show that, increases in academic achievement were significant in each subtest from baseline 2 to post-training 1, but only in the spelling subtest between post-training 1 and 2. A possible explanation for this finding is that the last two weeks of the school year were devoted to review: consequently, very little new material was introduced between post-training 1 measurement and post-training 2.

The consistent increases in spelling may have been due to immediate reinforcement. Throughout both baseline and post-training periods, a daily spelling test was given in a group situation with immediate correction and reward. Moreover, the teacher dispensed candies to all students who had perfect work. This practice was not initiated by the investigator, but rather was an idiosyncrasy of the teacher which, significantly, was not followed in any other subject area.





Also of interest are changes which occurred in student-teacher interaction. It may be recalled that the teacher's use of criticizing and disciplining substantially decreased during the post-training period, while praise and encouragement were used more liberally. The teacher appeared to have become more receptive to student ideas as well. One may speculate that because of the teacher's increased "receptivity", students initiated conversation much more than they did in baseline periods. It could be that the social reinforcement of the teacher's praise was the direct cause of increased student-initiated talk; conversely, students may have been more willing to respond when criticizing remarks from the teacher became less frequent. Finally, silence and confusion decreased considerably after training. During baseline periods, confusion and silence were generally centered around criticizing statements from the teacher, as evidenced by inspection of the Flanders' matrix.

### *Discussion of the Program*

*Evaluation by the teacher.* Two forms of evaluation were given by the teacher: (1) a report stating over-all impressions of the training program and the resultant effects in the classroom; and, (2) a structured questionnaire prepared by the investigator. Both these evaluation forms are given in Appendix O.



The training program was judged by the teacher to be, on the whole, "very good". The programmed text, *Living With Children: New Methods for Parents and Teachers* (Patterson and Guillion, 1968), was thought to be a good starting point because "it made other studies and terminology make sense". The film and video-tapes were considered extremely useful -- "especially the Lennie tape" (Appendix D). Finally, the theory (or principles) was considered to be necessary to allow adaptations of techniques to a particular pupil or classroom.

Besides the increased time spent in academic work, the teacher felt (subjectively) that certain other benefits resulted from the implementation of operant principles and techniques in her classroom. In summary:

- (1) The students exhibited better behavior outside the classroom (as well as in the classroom).
- (2) They became more helpful to one another.
- (3) They seemed to become more independent and responsible (they did not need as many directions).
- (4) They asked more questions about their work.
- (5) They appeared more relaxed. (See letter in Appendix O).

It is significant to note that, although there were changes in the teacher's distribution of time spent in various activities (e.g. marking, lesson planning, etc.),



overall time devoted to these activities actually decreased after the training program. When the teacher was questioned concerning the increased marking time after training, she replied, "Well, they got so much more work done that marking *had* to increase."

*Evaluation by the students.* The students answered a questionnaire concerning the "point system". All students indicated that they liked the points and that they wanted to have them next year. The prizes appeared to be a big attraction; they all said that they would rather have free time *and* prizes instead of increased amounts of free time. To the question "Why do you think the teacher started the points?", every student gave an answer of the type, "So you'll get lots of work done and do it right." Suggestions for improvement? "Have points for everything!"

*Evaluation by administrators.* The effect of the techniques used by the teacher came to the attention of administrators in the school, and from the School Board. The principal of the school felt that the Junior Opportunity Class students could now serve as examples of good behavior for the entire school. He strongly urged the experimenter to come back to work with the two new Opportunity Class teachers arriving next year. The Opportunity Class Consultant, aware of the changes which had occurred, arranged observation visits to the experimental classroom



for other Opportunity Class teachers. In short, both the teacher and experimenter received a considerable amount of positive reinforcement for their efforts.

*Evaluation of costs of the program.* Important considerations of a program are the cost of the materials used and the cost in professional time. For the teacher training program itself, cost was minimal due to the availability of University facilities and equipment. The cost of the materials and rewards used in the classroom amounted to approximately twenty dollars for the eight-week period. Thus, it appears that cost in professional time would be the major factor in any decision to repeat the project. Because only one teacher was involved in the training program, the amount of professional time spent on the program may seem to be disproportionately high. However, this investigation was in the nature of a pilot study, and any repetition would certainly involve more than one teacher. Therefore, the focus must fall upon time spent in consultation with the teacher after training. Although it is felt that the average of two hours a week is not unrealistic in terms of consulting time, this would probably decrease or be economically distributed if more teachers were involved.





## *Implications*

### *Implications for Research*

Although the training program proved effective in "workshop" form, the results of an extended period of training should be investigated. The efficiency of the "lab course" approach as opposed to the concentrated presentation seems to be a question worth answering.

The number of teachers to be accommodated in a training program should also be considered. Consultation sessions constitute an important part of follow-up: how many teachers can be given adequate consulting time at once? Perhaps a better question would be: how may consultation time be made most efficient? There seems to be a number of possibilities: weekly meetings; telephone or written feedback; and, periodic observation by the consultant.

Finally, the materials used in the training program should be subject to continual review. New films and published materials should be investigated as possible alternatives to those presently in use. It is imperative that each training program be evaluated in some standard way by those involved. Also, continuous objective feedback should be obtained from the classroom, as the true test of the effectiveness of the training program will be in actual behavior change.



*Implications of Operant Technique for Education*

The behavioral approach is essentially optimistic. As Baumeister (1969, p. 49) comments: "There are no notions of 'underlying defects' or 'incurability' inherent in this theory ...." The reason for the positive outlook is that the behavior modifier assumes that behavior is acquired -- or learned -- as the result of causal relations between behavior and the environment (i.e. behavior is not a function of internal causation). Instead of attributing failure to unseen forces in the child, failure is attributed to a non-facilitative arrangement of environmental circumstances. Because the behavioristic approach focuses upon arranging the environment to effect behavioral change, the teacher is freed of the necessity and responsibility for quasi-diagnostic questions and labelling.

Rearrangement of the environment for the special class (or regular class) child may call for the introduction of concrete reinforcers to allow for establishment of desirable behavior. Hopefully, teachers have come beyond the stage of condemning the behaviorial approach as "bribery". For those who continue in this argument, however, it should be pointed out that a bribe is used to induce someone to commit an act which is, in some way, illegal or unethical. It is a form of reinforcement for making a response the individual should not be making. Surely appropriate behavior and attention to academic tasks fit



none of these categories.

At any rate, the use of concrete reinforcers is not seen as an attempt to subvert the moral fibre of the child, but rather as the first halting step on the path of rehabilitating a child who is both *rejecting of* and *rejected by* the normal academic situation (such is the case with the potential dropout and the culturally deprived child as well as with the special class child). If behavior which "should" occur without planned extrinsic reinforcement does not occur, a program of extrinsic reinforcement should well be evaluated along with other common alternative approaches such as increased aversive control or simply accepting failure. In other words, if the child fails to respond, we may either punish him or neglect him. Certainly the positive approach holds more promise than either of those alternatives.

Finally, the "doomsday principle" has been in operation far too long in all our classrooms -- from first grade through graduate school. Impending doom ("do your work or else") is replaced in the behavioristic approach by a fair and positive contract. It seems that allowing a child to choose for himself, without coercion or threat, whether or not he wishes to earn available rewards, would definitely encourage the development of responsibility. The choice and the responsibility for its consequences lie with the student. Perhaps the behavioristic approach could



result in the existentialist ideal: the fully actualized person.





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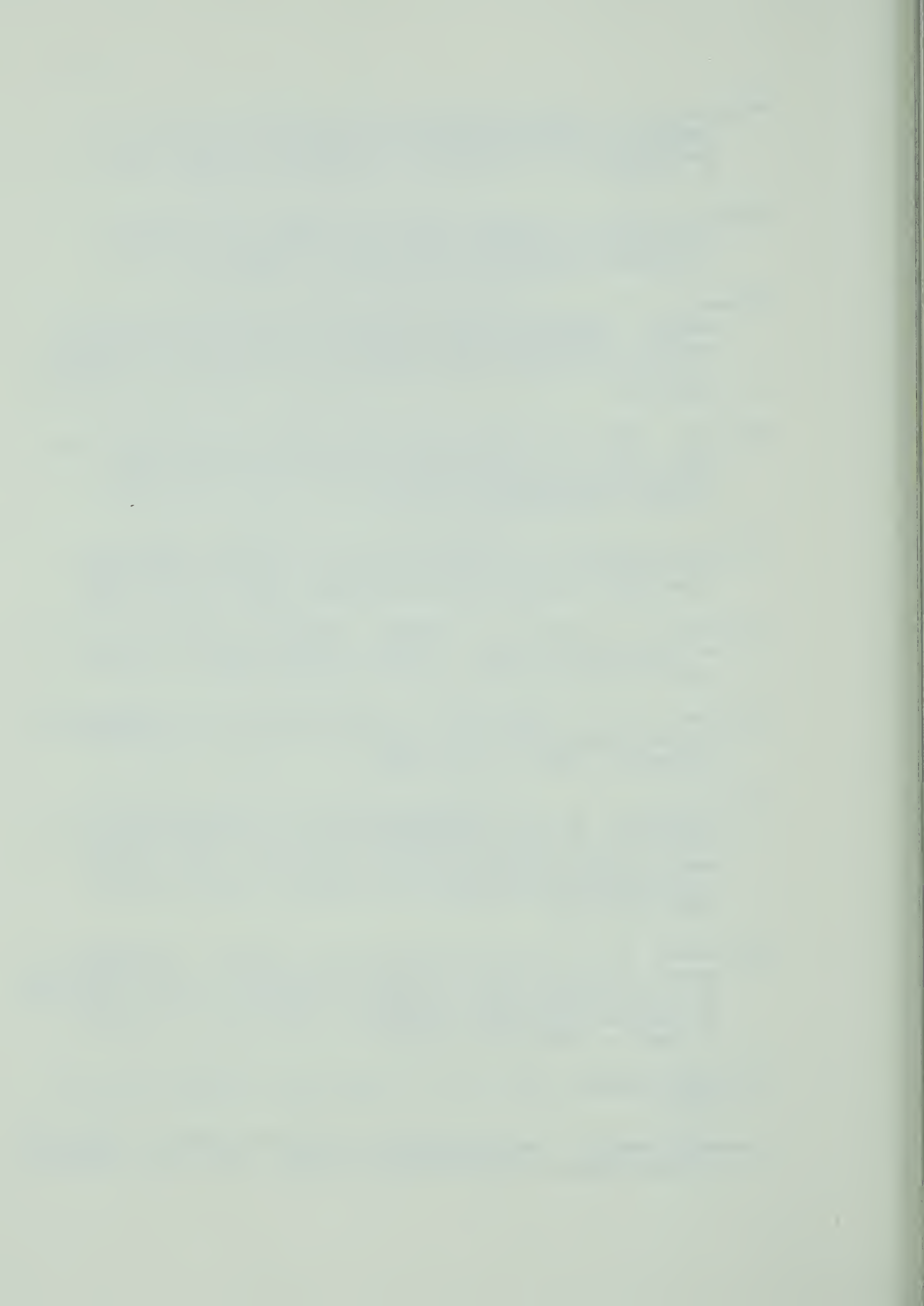




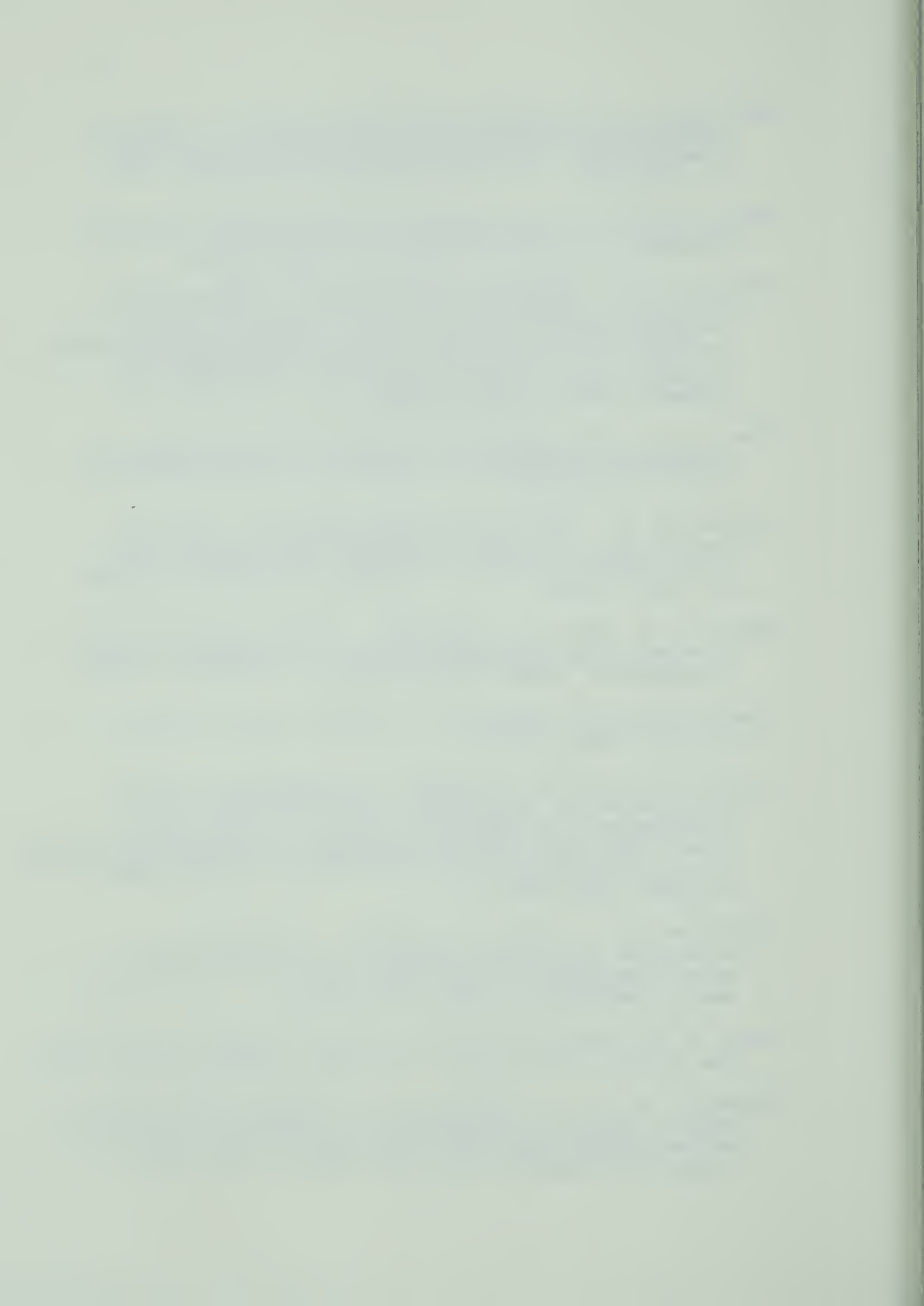
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A P P E N D I C E S



# A P P E N D I X      A

## CRITERIA FOR ACADEMIC AND NON-ACADEMIC BEHAVIOR



## APPENDIX A

## CRITERIA FOR ACADEMIC AND NON-ACADEMIC BEHAVIOR

Academic Behavior

- (1) Doing assignment: seat work (reading, exercises, arithmetic, study).
- (2) Writing tests.
- (3) Copying boardwork.
- (4) Listening to teacher (when required) or other students when answering.
- (5) Working with teacher (independent or group).
- (6) Helping another student when asked to do so.
- (7) Getting materials ready.
- (8) Waiting for correction at teacher's desk or in seat (unavoidable delay).
- (9) Doing errands for teacher (in the classroom).

Non-Academic Behavior

- (1) Behaving disruptively: bothering another student (poking, teasing, etc.); crying or pouting; fighting; shouting out at other students.
- (2) Non-assigned drawing or "doodling".
- (3) Conversing with other students (not concerning work).
- (4) Wandering about classroom (watching other students, getting drink, watching pets).
- (5) Distraction: looking out window, staring into space, watching other pupils or teacher (when she is working with other pupils).





## A P P E N D I X      B

### READING ASSIGNMENTS



## APPENDIX B

## READING ASSIGNMENTS

- (1) Patterson, G. R. and M. E. Guillion. *Living with Children: New Methods for Parents and Teachers*. Champaign, Ill.: Research Press, 1968.

List at least ten things which you have learned or like about this book. Also, list any criticisms or questions which you might have.

- (2) Valett, R. E. A social reinforcement technique for the classroom management of behavior disorders. *Exceptional Children*, 1966, 33, 185-189.

Quay, H. C., J. S. Werry, M. McQueen, and R. L. Sprague. Remediation of the conduct problem child in the special class setting. *Exceptional Children*, 1966, 32, 509-515.

From the articles: List 3 *good* things you have learned from each of the articles. Now, try to give three criticisms and ask three questions.

- (3) A paper by Marilyn Crozier -- submitted as a proposal for this project. Topics: operant conditioning in behavior modification; methods and research.

When reading this paper, look for the following terms and try to be able to explain them in your own words and give "every day" examples:

- operant behavior
- positive reinforcer
- negative reinforcer
- scheduling
- discrimination
- generalization
- shaping
- extinction
- punishment
- contingency
- Premack's principle
- programming

### Classroom Assignment

To pick a specified period of time -- say between ten and eleven in the morning -- and count the number of times a behavior which is undesirable occurs (e.g. the number of



times that Johnny talks out of turn). A wrist counter will be used. All time spent in preparing for the program should be tabulated.



A P P E N D I X      C

QUESTIONS





## APPENDIX C

## QUESTIONS

- (1) We believe that a problem child acts the way he does, not because he was born that way, but because he was \_\_\_\_\_ to behave that way.
- (2) When you are talking, your friends \_\_\_\_\_ you by being good listeners.
- (3) To teach a person to respond in a desired way, we give him positive reinforcement for the desired \_\_\_\_\_.
- (4) The difficult thing is to be consistent and continue reinforcing the desired behaviors. The problem is that most of us tend to take desirable behavior for granted rather than remembering to \_\_\_\_\_ it.
- (5) Giving a person positive reinforcers \_\_\_\_\_ behavior, and not reinforcing behavior \_\_\_\_\_ it.
- (6) When a new behavior is being taught, reinforcements should be given \_\_\_\_\_ after the behavior occurs.
- (7) The reinforcements should be given at first for small steps and later for \_\_\_\_\_ steps.
- (8) If you were beginning to teach a child to "mind", you would try to reinforce him \_\_\_\_\_ time he minds you.
- (9) He might mind several times without your reinforcing him for it. If you forget and never reinforce him for minding, that behavior will be \_\_\_\_\_.
- (10) Studies show that once behaviors are learned, they are more likely to last if the behavior is not reinforced every time. Reinforcing every time is good during the \_\_\_\_\_ stages of learning a behavior, but later on it is better if you reinforce the behavior only \_\_\_\_\_.
- (11) A response that is reinforced is more likely to occur again in the future. If a response is successful in turning off a painful event, that response will occur \_\_\_\_\_ frequently in the future.
- (12) Sally wants the toy that her brother is playing with. She whines and then whines louder, until her mother gets upset about the noise and tells the brother to give Sally the toy. In this situation, Sally was being reinforced for \_\_\_\_\_.



- (13) The reinforcer that Sally received was the \_\_\_\_\_.
- (14) The reinforcer obtained by her mother was the "turning off" of the unpleasant event of Sally's \_\_\_\_\_.
- (15) Our prediction would be that in the future when things are not going the way Sally wants them to, she would \_\_\_\_\_.
- (16) The first step in changing an undesirable behavior is to \_\_\_\_\_ the behavior.
- (17) For each problem, it is up to you to think of a behavior that would replace it. Such a "replacing" behavior is \_\_\_\_\_ with the undesirable behavior.
- (18) Your task is to find ways to \_\_\_\_\_ the undesirable behavior and to strengthen the \_\_\_\_\_ behavior.
- (19) When a child has a temper tantrum, he is told he has to spend five minutes in the basement. The procedure is called \_\_\_\_\_ and must be carried out \_\_\_\_\_ time the tantrums occur.
- (20) You might give 50 to 100 reinforcers before the new behavior is \_\_\_\_\_ enough to replace the unwanted behavior.
- (21) Before you begin to change any behavior, you must first observe and \_\_\_\_\_ it.
- (22) After real improvement has occurred, you can gradually reduce the amount of toys, candy, or money being earned, and increase the amount of \_\_\_\_\_ given.
- (23) For most parents, non-reinforcement would be a much more successful method of changing behavior than \_\_\_\_\_.
- (24) A program for working with negativism would have to include a way of weakening the negativistic behaviors. One way is to \_\_\_\_\_ the behavior.
- (25) If you see that a child is not earning any points, then you must make your step increase \_\_\_\_\_.



Key

1. taught
2. reinforce
3. response
4. reinforce
5. strengthens - weakens
6. immediately
7. larger
8. every
9. weakened
10. early - occasionally
11. more
12. whining
13. toy
14. whining
15. whine
16. observe (or count)
17. competing
18. weaken - desirable
19. time-out - every
20. strengthened
21. count (or graph)
22. social reinforcers
23. punishment
24. ignore
25. smaller



A P P E N D I X       D

THE "LENNIE" TAPE





## APPENDIX D

## THE "LENNIE" TAPE

This is a video-tape made by Dr. D. R. Cameron, Mr. Richard Crozier, and Mrs. Sue Norton of the Centre for the Study of Mental Retardation, the University of Alberta.

The subject of the tape is the teaching of self-help skills to young mongoloid children by using reinforcement and programming.

The children were taught in a one-to-one situation, and food was used as a primary reinforcer, as they were sent without breakfast (in cooperation with the experiment, parents gave the children a glass of juice only before they came to school).

Self-help skills such as putting on and taking off clothes, response to directions, and habits of personal hygiene were broken down into very small steps so that success would be "guaranteed". For instance, a great deal of physical prompts and gestures were given at first, but these were gradually faded until the child would respond to verbal direction only.

Sequences shown:

the child before training,  
the child training without reinforcement,  
the child training with reinforcement,  
the child after training, with social reinforcement.

Primary rewards of food were always paired with secondary reinforcers of praise, smiles, pats and hugs.

Behavior which was inappropriate was weakened through non-reinforcement and a "time-out" procedure (ignoring child or leaving him in room alone).

The principles were summarized very well by Dr. Cameron and Mrs. Norton. The following were emphasized:

- (1) systematic rewarding and non-rewarding,
- (2) consistency in rewarding and non-rewarding,
- (3) shaping,
- (4) programming (very small steps),
- (5) use of primary rewards in early stages, with eventual shift to social reward,



- (6) continuous reinforcement at first, to establish behavior, then gradually shifting to intermittent reinforcement to maintain behavior,
- (7) consequences of behavior should be immediate to provide most effective feedback to the child.

Time for showing: 45 minutes.



# A P P E N D I X      E

## MAJOR PRINCIPLES



## APPENDIX E

### MAJOR PRINCIPLES

#### Operants

The individual "operates" on his environment. An operant is an act. When the baby says "da-da", he is reinforced or rewarded by his parents' smiles and hugs -- or perhaps by a piece of food. When a behavior (act, operant) is rewarded, it increases. Since a person's appetite will eventually decrease, it is important that we are able to use other things such as praise (a secondary reinforcer).

#### Extinction

A behavior is extinguished if it is not reinforced, or if it is ignored.

#### Punishment

Punishment may occur in two ways: (1) take away something good, and (2) present something bad (slap).

Punishment depends on the individual -- what is punishing for some is not for others.

When the punishment is removed, the activity may begin again.

#### Scheduling

At first, a desirable response is reinforced every time it occurs. (e.g. when a baby is learning to talk). When the behavior is firmly established, however, it is only necessary to reinforce it once in a while to maintain it.

Fixed schedule -- after so many responses (e.g. 100) a reward is given. Or, after a fixed amount of time (a weekly salary).

A variable schedule is the kind on which a gambler or door-to-door salesman operates.





### Discrimination

This is learning what response to make in particular situations. A child learns that he can do things at home that he cannot do in school or in stores.

### Generalization

A child learns that he can do the same things at Gramma's house that he can do at his own house. Or, he transfers what he has learned to new situations.

### Shaping

Shaping is gradually molding the response. When a baby first tries to say water, he is reinforced for saying anything close (wa-wa), but as he grows older, he is expected to speak more exactly and is not reinforced until he does.

### Immediate Contingency

Contingent means that the reward is given only when the behavior that you want occurs. Also, the reward is given immediately after the behavior occurs.

### Premack's Principle

This is following a not very desirable task (eating all the vegetables on a plate) by a highly desired task (playing with a model airplane).

### Eliminating Undesirable Behavior

By extinction (differential reinforcement).  
By punishment.

#### Punishment

##### Advantages

It is informative.  
It stops the behavior immediately.  
It serves as a model.

##### Disadvantages

It may cause generalization.  
The child may attempt escape.  
It may cause aggression.  
It may be imitated later (the punished act).  
The child may be avoided by others (e.g. criminals).



The effectiveness of differential reinforcement is greatest if the reinforcement comes immediately and consistently each time the behavior occurs.

Punishment is most effective when it is not too long, and when it is introduced with maximal intensity rather than in gradually increasing amounts.

Punishment is useless unless the child is shown an alternate or competing behavior with which to replace the undesirable or punished behavior. If a child is punished for being selfish, he must be taught to share so that he may be reinforced.

### Key Words

Immediate

Systematic

Consistent

Individualized

Programmed

Objective

Operational

Social must be paired with non-social.

Contingent (everything must be earned).



A P P E N D I X      F

FILM

CONTROLLING BEHAVIOR THROUGH REINFORCEMENT



## APPENDIX F

## FILM

## CONTROLLING BEHAVIOR THROUGH REINFORCEMENT

Uses pigeons in a controlled experiment to show what happens in human and animal behavior when the psychological principles of fixed-ratio, fixed-interval, types of reinforcement are applied to an organism. Compares similar behavior patterns between the pigeons and a typical classroom situation in which elementary children are observed. Points out that variable-interval reinforcement produces the most satisfactory results in the pigeons and extremely persistent behavior which is difficult to extinguish in the children.

16 minutes     1956

black and white

McGraw-Hill





## A P P E N D I X      G

### VIDEO INTERVIEW WITH TEACHERS



## APPENDIX G

## VIDEO INTERVIEW WITH TEACHERS

I. Theory and Principles

What do you understand by the term "positive reinforcement"?

What changes in classroom approach were required?

Is punishment used?

How do you provide for individual differences?

Pairing of social with points.

Immediate - contingent - consistent.

II. Method

What method of token economy - points, cards, charts?

When are points given out?

What are the behaviors for which points may be earned?

Who made up the rules?

Are there some rules that are not to be broken: i.e. that will bring punishment.

What punishments are used? (time-out, taking away cards)

Individual folders - how do these work?

What rewards do you use: variety, when may they be given out, how are they distributed. How many points are required for various rewards?

III. Evaluation

What good things happened as a result of this program?

Did it improve: discipline,  
academic work,  
organization?

Did all children seem to benefit from this program?

Did they like it?

Was it time-consuming to administer? Was it worth the time?

Was it hard to find rewards that were suitable, at a low cost?

SUGGESTIONS



## A P P E N D I X      II

### METHODS



## APPENDIX H

## METHODS

Point system  
Poker chips

Recording: daily, weekly, monthly, work cards.  
bankbook  
chart on the wall  
two-sided card: privilege/money  
green stamp booklet

Group points:

during lunchhour  
during a specified time when a clock is running

Removal of tokens for "costly" behaviors

Time-out

Self-recording

The following must be specified

The behaviors to be rewarded (academic-nonacademic).  
The "costly" behaviors.  
Behaviors which will cause "time-out".  
When points will be recorded.  
When rewards will be given out.  
How many points will be required for different rewards.

Implementation of the Program

Behavior must be shaped - points may have to be given for "not so good" behavior at first.

Start off with giving rewards fairly soon and often. Later on, the children will earn points for a whole week before they exchange them for prizes.

Always pair social reinforcers with non-social.

Programmed folders for each student - must have enough work to keep them busy. Set standards fairly low at first, but increase gradually.





# A P P E N D I X I

## REWARDS



## APPENDIX I

## REWARDS

Privileges

- errands
- extra recess
- extra phys. ed.
- films
- parties
- field trips
- games
- feeding animals
- using certain equipment

Tangibles

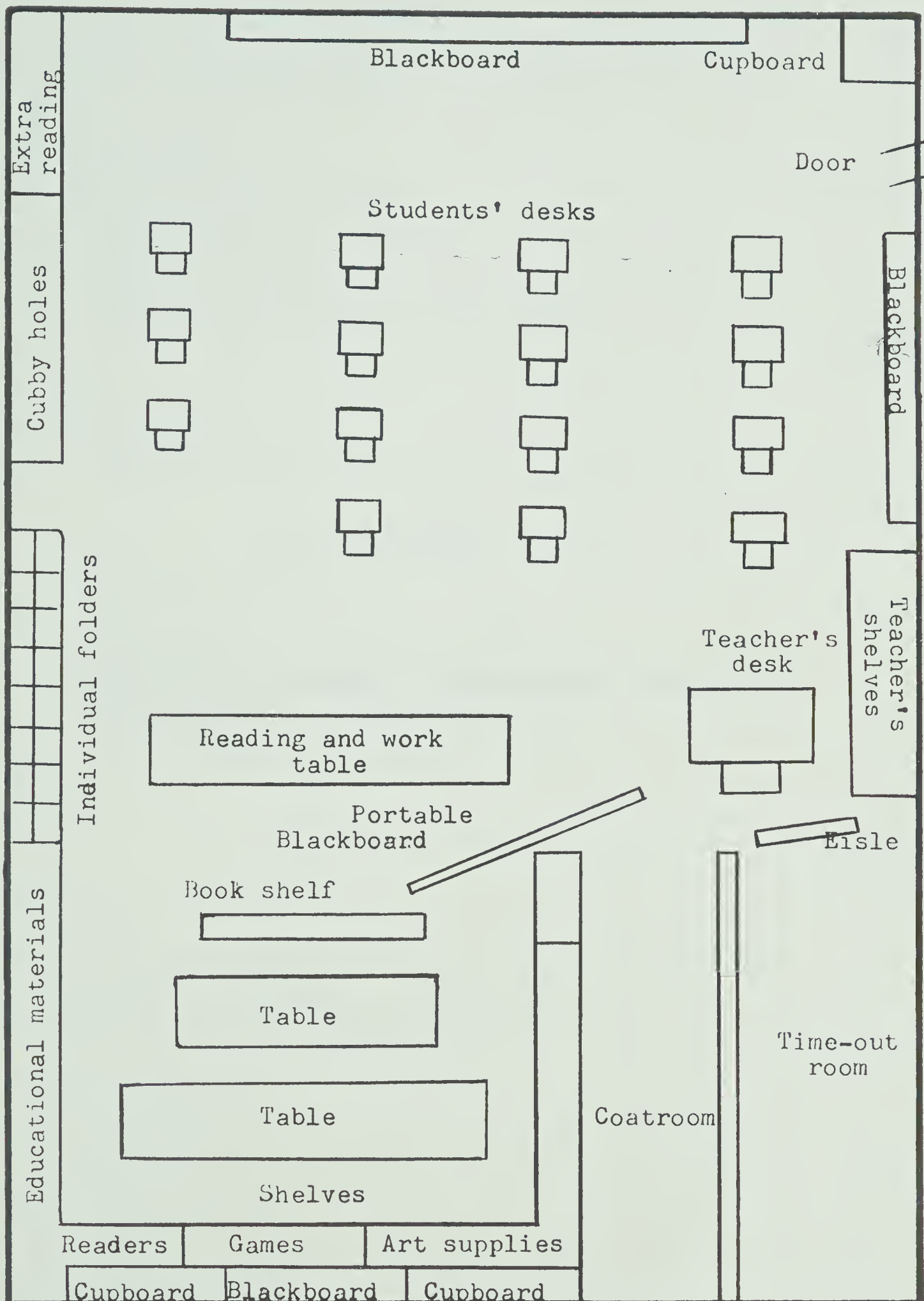
- money
- school supplies
- comic books
- other books
- small toys
- magnifying glass
- magnet
- combs, barretts, ribbons
- food (chocolate bars, candy)
- cards
- plasticene
- coloring pencils



A P P E N D I X      J

DIAGRAM OF CLASSROOM









A P P E N D I X      K

RECORD OF TIME SPENT BY EXPERIMENTER AND TEACHER



## APPENDIX K

## RECORD OF TIME SPENT BY EXPERIMENTER AND TEACHER

Experimenter

<u>Preparing for Program:</u>	<u>Hours</u>
Video-taped interview	2
Preview of film	1 1/2
Preview Lennie tape	1
Preparing and writing out program	15
Final arrangements at University	1
	<hr/> 19 1/2
<u>With Teacher:</u>	
Training program	8
Buying prizes, rearranging classroom	8
	<hr/> 16
<u>Consultation and Observation:</u>	
By phone, May 5	1
Observation in classroom, May 6	4
Observation in classroom, May 13	3
By phone, May 16	1
Observation in classroom, May 21	2
Observation in classroom, June 9	2
Observation in classroom, June 18	3
	<hr/> 16
	<hr/>
Total --	<hr/> 51 1/2 <hr/>

Teacher

Independent reading in preparation for program	5
Training program	8
Buying prizes, rearranging classroom	8
Setting up individual folders	4
	<hr/> 25
<u>Consultation:</u>	
May 5	1
May 6	2
May 13	1
May 16	1
May 21	1
June 9	1
June 18	2
	<hr/> 9
	<hr/>
Total --	<hr/> 35 <hr/>



A P P E N D I X      L

JOB SHEET



My work				Name _____
Reading				
Day	Pages	New words	Workbook	More work
Mon				Phonics _____ Worksheet _____ Sentences _____
Tues				Phonics _____ Worksheet _____ Sentences _____
Wed				Phonics _____ Worksheet _____ Sentences _____
Thurs				Phonics _____ Worksheet _____ Sentences _____
Fri				Phonics _____ Worksheet _____ Sentences _____
Arithmetic			Workbbok	More work
Mon				
Tues				
Wed				
Thurs				
Fri				
Spelling				
Mon				
Tues				
Wed				
Thurs				
Fri				





A P P E N D I X      M

POINT SHEET







A P P E N D I X        N

SUMMARY OF ANALYSIS OF VARIANCE OF WRAT READING, SPELL-  
ING, AND ARITHMETIC SCORES DURING THE FOUR DIFFERENT  
OBSERVATION PERIODS



## APPENDIX N

## SUMMARY OF ANALYSIS OF VARIANCE OF WRAT READING, SPELLING, AND ARITHMETIC SCORES DURING THE FOUR DIFFERENT OBSERVATION PERIODS

TABLE 8

## SUMMARY OF ANALYSIS OF VARIANCE OF WRAT READING SCORES DURING THE FOUR DIFFERENT OBSERVATION PERIODS

Source of Variation	Sum of Squares	Degrees Freedom	Mean Square	F Ratio	Significance
Between people	2505.56	10	250.56		
Within people	293.25	33	8.89		
Treatments	121.69	3	40.56	7.09	.02*
Residual	171.56	30	5.71		
Total	2798.81				

\*Significance level is reported for the conservative probability of F.

TABLE 9

## SUMMARY OF ANALYSIS OF VARIANCE OF WRAT SPELLING SCORES DURING THE FOUR DIFFERENT OBSERVATION PERIODS

Source of Variation	Sum of Squares	Degrees Freedom	Mean Square	F Ratio	Significance
Between people	626.68	10	62.67		
Within people	105.75	33	3.20		
Treatments	48.25	3	16.08	8.93	.01*
Residual	57.50	30	1.91		
Total	732.24	43			

\*Significance level is reported for the conservative probability of F.





TABLE 10

SUMMARY OF ANALYSIS OF VARIANCE OF WRAT ARITHMETIC SCORES  
DURING THE FOUR DIFFERENT OBSERVATION PERIODS

Source of Variation	Sum of Squares	Degrees Freedom	Mean Square	F Ratio	Significance
Between people	136.64	10	13.66		
Within people	72.00	33	2.18		
Treatments	36.82	3	12.27	10.46	.008*
Residual	35.18	33	1.17		
Total	208.64	43			

\*Significance level is reported for the conservative probability of F.



A P P E N D I X      O

TEACHER'S QUESTIONNAIRE



APPENDIX O  
TEACHER'S QUESTIONNAIRE

"Teacher Training:

- (1) Very good, but two days was a bit short.
- (2) *Living With Children* was good as a starting point, as it made other studies and terminology make sense.
- (3) The films and video-tapes were good; especially the video on the mongoloid child being reinforced for tiny steps in learning to dress himself (and constant social reinforcement of teacher to the child).
- (4) The theory of the program is extremely important so that you can adapt it to your particular class and pupils. The discussions helped to clear up points that were not understood.

Class:

- (1) The program resulted in better all round behavior: for example, playground as well as classroom behavior improved, even when the students were not rewarded for it directly.
- (2) The children became more helpful to each other.
- (3) They became more independent and responsible -- the onus for good behavior was on them.
- (4) They learned something about "democracy" and government by having to accept majority rule on decisions of what to do with group points that had been earned.
- (5) The children felt more relaxed and asked more questions about their work (they wanted to know why they got things wrong).
- (6) Long range lesson planning was necessary rather than day to day -- could see things in better perspective.

I think rewards should be given in all aspects of school work to keep motivation high."



## QUESTIONNAIRE

	Problem behavior	Number of students in which this behavior was a problem	
		Before training	After training
	<u>Management</u>		
A.	Out of seat	9	3
B.	Talking out	8	2
C.	Talking back to teacher	3	1
D.	Inappropriate language (cursing)	4	2
E.	Yelling	4	1
F.	Hitting other children	3	2
G.	Changes activity at a high rate	7	1
H.	Doesn't follow directions	5	2
I.	Destructive	0	0
J.	Other (specify)		





	Problem behavior	Number of students in which this behavior was a problem	
		Before training	After training
	<u>Work Habits</u>		
	Slow rate of work		
A.	Reading	10	1
B.	Spelling	8	1
C.	Arithmetic	10	0
	Doesn't finish work		
A.	Reading	9	1
B.	Spelling	9	2
C.	Arithmetic	9	0
	Other (specify)		

TABLE I		Summary of Results	
Year	Month	Value	Unit
1980	Jan	100	kg
1980	Feb	120	kg
1980	Mar	150	kg
1980	Apr	180	kg
1980	May	200	kg
1980	Jun	220	kg
1980	Jul	250	kg
1980	Aug	280	kg
1980	Sep	300	kg
1980	Oct	320	kg
1980	Nov	350	kg
1980	Dec	380	kg
1981	Jan	400	kg
1981	Feb	420	kg
1981	Mar	450	kg
1981	Apr	480	kg
1981	May	500	kg
1981	Jun	520	kg
1981	Jul	550	kg
1981	Aug	580	kg
1981	Sep	600	kg
1981	Oct	620	kg
1981	Nov	650	kg
1981	Dec	680	kg
1982	Jan	700	kg
1982	Feb	720	kg
1982	Mar	750	kg
1982	Apr	780	kg
1982	May	800	kg
1982	Jun	820	kg
1982	Jul	850	kg
1982	Aug	880	kg
1982	Sep	900	kg
1982	Oct	920	kg
1982	Nov	950	kg
1982	Dec	980	kg

	Problem behavior	Number of students in which this behavior was a problem	
		Before training	After training
	<u>Social Behavior</u>		
A.	Doesn't participate in group	5	1
B.	Remains alone during free play	2	1
C.	Impolite to others	5	1
D.	Lack of cooperation	3	1
E.	Unwilling to help others	6	2
	Other (specify)		



	Time spent in activity	Before training	After training
1.	Lesson planning and preparation of materials	2 hr.	2 1/2 hr.
2.	Marking	1 hr.	1 3/4 hr.
3.	Lecturing and giving directions	2 1/2 - 3 hr.	1 1/2 hr.
4.	Disciplining and controlling	1/2 - 1 hr.	5 - 10 min.
5.	Other (specify)		
		Total = 7 maximum	Total = 6 maximum



# A P P E N D I X P

## BASIC DATA OF STUDY





APPENDIX P  
BASIC DATA OF STUDY

Key to Data Presented in Appendix P:

Columns 1 and 2 represent individual I.D. numbers.  
Columns 3, 4, and 5 represent chronological age (mos).  
Columns 6, 7, and 8 represent mental age (Binet).  
Columns 9 and 10 represent IQ (Binet).  
Columns 11, 12, and 13 represent mean of five observations taken at baseline 1.  
Columns 14, 15, and 16 represent mean of five observations taken at baseline 2.  
Columns 17, 18, and 19 represent mean of five observations taken at post-training 1.  
Columns 20, 21, and 22 represent mean of five observations taken at post-training 2.  
Columns 23, 24, and 25 represent gain score calculated between baseline 2 and post-training 2.  
Columns 26 and 27 represent WRAT reading score in baseline 1.  
Columns 28 and 29 represent WRAT reading score in baseline 2.  
Columns 30 and 31 represent WRAT reading score in post-training 1.  
Columns 32 and 33 represent WRAT reading score in post-training 2.  
Columns 34 and 35 represent WRAT reading gain score calculated from baseline 2 to post-training 2.  
Columns 36 and 37 represent WRAT spelling score in baseline 1.  
Columns 38 and 39 represent WRAT spelling score in baseline 2.  
Columns 40 and 41 represent WRAT spelling score in post-training 1.  
Columns 42 and 43 represent WRAT spelling score in post-training 2.  
Columns 44 and 45 represent WRAT spelling gain score calculated from baseline 2 to post-training 2.  
Columns 46 and 47 represent WRAT arithmetic score in baseline 1.  
Columns 48 and 49 represent WRAT arithmetic score in baseline 2.  
Columns 50 and 51 represent WRAT arithmetic score in post-training 1.  
Columns 52 and 53 represent WRAT arithmetic score in post-training 2.  
Columns 54 and 55 represent WRAT arithmetic gain score calculated from baseline 2 to post-training 2.  
Columns 56, 57, and 58 represent observations taken by rater X when establishing interrater reliability.  
Columns 59, 60, and 61 represent observations taken by rater Y when establishing interrater reliability.



BASIC DATA OF STUDY

01124078631982804025102303029303607242322230019192222203497497  
0212210580275367430476109393946420325282828002524252602322298  
031310956938632548952720256565654-232343434002423283007168163  
0411909780348269487473204494953520333313134032525272702284289  
0512507357346326462509183394044470726272932052424262602434475  
0614609065321295426471176393738450829283032042424262703245250  
07121087713323094494632214242414402252731320522222321-1279275  
0814409367302242461431189524953560728313230-12425232500261255  
091320946826930854552822055556053-235353737022626272701503502  
1012810682216300500480180353946430427282831032222252402360336  
1112008167401378545487109525155530235373737002424252501



## BASIC DATA OF STUDY

Key to data presented below:

Columns 1 and 2 represent individual I.D. numbers.

Column 4 represents major time period: 1 is baseline 1; 2 is baseline 2; 3 is post-training 1 and 4 is post-training 2.

Column 5 represents which observation the score describes (1, 2, 3, 4, or 5).

Columns 6, 7, and 8 represent the observation score, in seconds.

0111169	0913098	0621259	0324284	1131595
0211156	1013302	0721056	0424293	0132457
0311222	1113384	0821251	0524316	0232412
0411422	0114087	0921057	0624245	0332565
0511248	0214123	1021212	0724279	0432545
0611408	0314393	1121408	0824180	0532398
0711348	0414317	0122182	0924258	0632376
0811127	0514386	0222221	1024095	0732528
0911419	0614420	0322355	1124323	0832536
1011409	0714267	0422306	0125322	0932540
1111542	0814256	0522143	0225363	1032548
0112116	0914392	0622273	0325490	1132505
0212307	1014126	0722279	0425308	0133317
0312494	1114383	0822217	0525336	0233395
0412242	0115396	0922542	0625288	0333600
0512262	0215446	1022396	0725520	0433456
0612426	0315452	1122505	0825292	0533451
0712311	0415362	0123196	0925216	0633441
0812388	0515412	0223499	1025513	0733457
0912302	0615277	0323168	1125235	0833443
1012123	0715420	0423225	0131341	0933594
1112442	0815389	0523434	0231420	1033468
0113224	0915136	0623411	0331429	1133526
0213344	1015120	0723390	0431520	0134480
0313368	1115268	0823261	0531534	0234560
0413388	0121174	0923395	0631534	0334410
0513410	0221312	1023303	0731485	0434415
0613074	0321386	1123360	0831550	0534505
0713316	0421215	0124497	0931527	0634503
0813148	0521402	0224438	1031548	0734316



0834375	0144502
0934578	0244572
1034476	0344472
1134571	0444525
0135416	0544566
0235363	0644381
0335443	0744465
0435501	0844438
0535442	0944540
0635275	1044445
0735452	1144572
0835400	0145439
0935484	0245385
1035459	0345542
1135528	0445392
0141582	0545525
0241422	0645501
0341582	0745433
0441495	0845474
0541514	0945464
0641540	1045536
0741524	1145433
0841395	
0941572	
1041484	
1141403	
0142490	
0242459	
0342577	
0442420	
0542484	
0642582	
0742424	
0842444	
0942568	
1042500	
1142490	
0143538	
0243541	
0343460	
0443534	
0543456	
0643352	
0743470	
0843406	
0943494	
1043434	
1143537	











**B29951**